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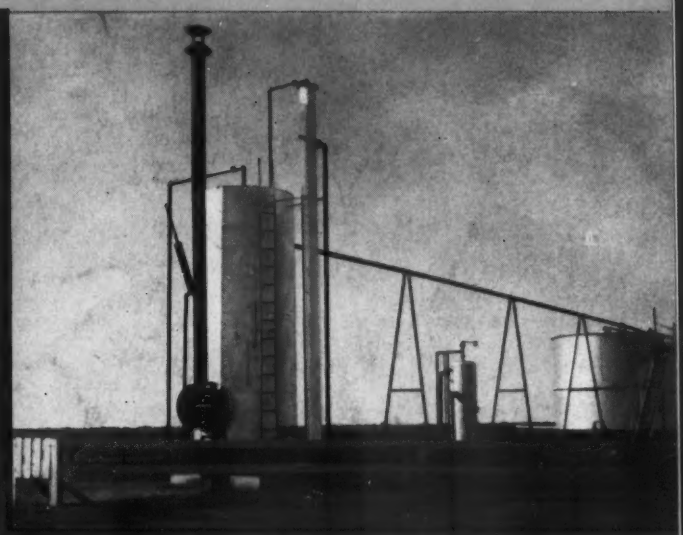

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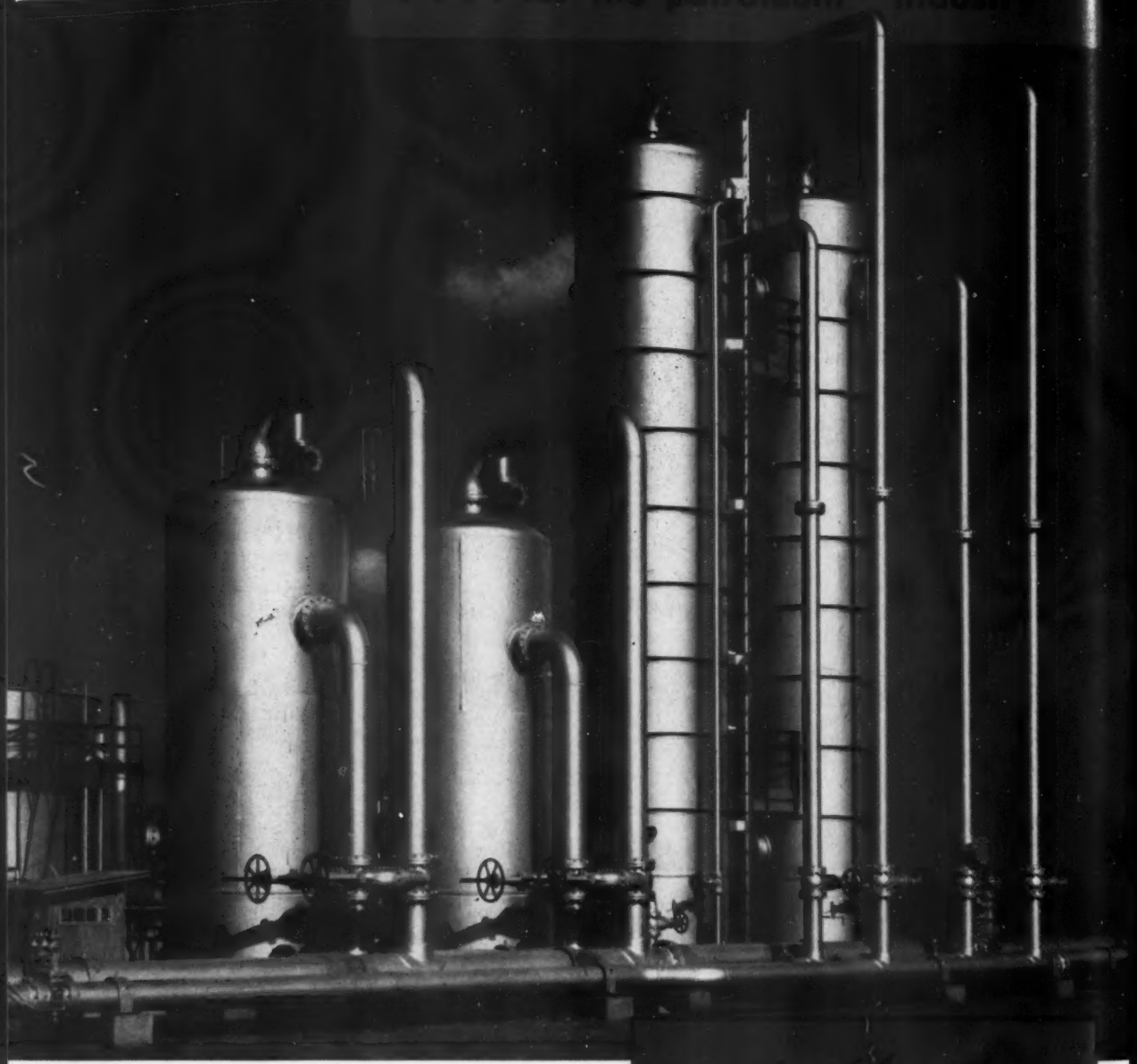

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211 S. CHEYENNE AVE., TULSA 1, OKLAHOMA

FOUNDED IN 1910 BY PATRICK C. BOYLE

Subscription rate to the petroleum industry, United States and foreign, 1 year, $3.00. Single copies, 20 cents. Back copies, when over a year old, 50 cents. Note: Payments from outside the U.S.A. may be in the form of an international money order or check on a U.S.A. bank. Entered as second-class mail matter at Tulsa, Okla., under Act of March 3, 1879.

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Vol. 46, No. 25 October 25, 1947

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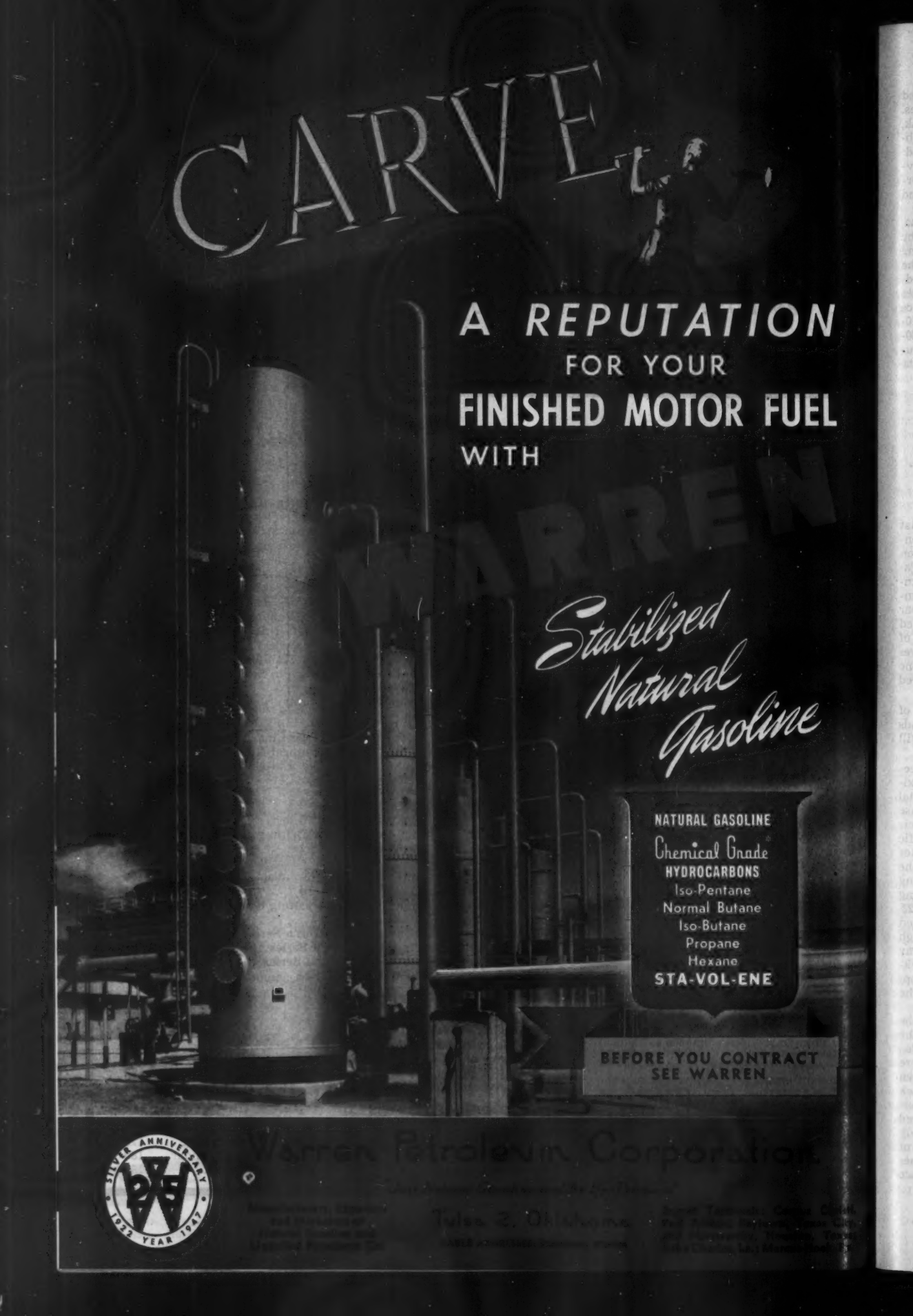
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Gas Act Revision

LEGISLATION to revise the Natural Gas Act was shelved abruptly, near the end of the last session of Congress, amid charges of unfair lobbying and pressure tactics by both the producers and transporters of natural gas and the Federal Power Commission.

If the next session picks up the issue at the same place there is little prospect that a satisfactory new law can be enacted. During the recess both parties should have had a chance to cool down from their fever pitch and take an objective view of the practical problems of modernizing and improving the gas act, an objective which all admit is necessary.

There is evidence that FPC has done this and that it is now ready to meet the industry half way if industry leaders are willing to consider a give-and-take program. The preliminary chapters of FPC's gas-investigation report, and other recent commission statements, point the way toward workable solutions of some of the problems with which Congress wrestled inconclusively last spring.

Now Chairman Smith has issued an open invitation to the natural-gas industry to talk over problems of regulation and legislation. He does not promise full agreement but hopes, at the minimum, for a narrowing of the issues which will be left for Congress to decide.

In a noteworthy speech before the American Gas Association recently the FPC spokesman went rather far, for a federal administrator, in agreeing with some of the industry's criticisms of the present status of the law. While insisting that the public interest will not permit acceptance of all the remedies in the industry-supported legislation, he more than hinted at compromise solutions of such controversial issues as end-use control, field price in determining rates, production and gathering regulation, and exemption of local distribution.

Throughout its gas investigation and during Congressional consideration of legislation FPC has been disappointed at what it insists is the industry's stiff-necked determination to bull through its own legislative formula. Whether by lobbying or otherwise the commission did manage to kill such legislation last spring and might contrive to do so again.

But before the final showdown FPC is willing to discuss the whole range of problems informally with the industry's policy makers in the hope of finding at least some areas of understanding.

Certainly no harm could come from such exploratory conversations. If they should result in providing Congress with more light and less heat on the subject of Natural Gas Act revision both the industry and the public would gain. With several new systems and enlargement programs under construction in natural-gas operations, prompt action is imperative.

Crude Price Advanced 20 Cents; Mid-Continent Oil Now $2.15

CRUDE-OIL prices in Mid-Continent, Rocky Mountain, and Southwest fields were advanced generally 20 cents a barrel last week in the fifth increase since the war's end.

The advance brought the price of 40°-gravity and above Oklahoma-Kansas crude to $2.15, highest since the summer of 1926. Based on the current record production and excluding California and Pennsylvania fields, the increase means approximately $860,000 daily additional for the nation's crude-oil producers.

Phillips Petroleum Co. announced a flat 20-cent increase October 15. Earlier in the day, Southern Minerals Corp., Corpus Christi, which produces and buys some 40,000 bbl. daily, announced a 20-cent increase for 38 fields in Southwest Texas.

The action of the two companies recalled a statement late in September in New York by K. S. Adams, Phillips president, that the industry would be in a much sounder position if it were to raise crude prices and eliminate the "black market" in premiums and connections. At the time, the Phillips president said he believed the advance could be made without a corresponding increase in products prices.

Early this week, however, products markets were generally ½ to ¾ cents higher, largely as a result of the crude advance *(for details on products markets, see page 172).*

Major purchasing companies fell quickly into line last week when the news of Phillips' advance became known. The tight crude market left other companies little choice to meet the raise or face loss of their connections.

The general advance broke through the "hold the line" price policy of the Standard Oil Co. (N.J.) organization. October 16, Humble Oil & Refining Co., largest buyer in Texas and a Jersey Standard affiliate, met the increase. H. C. Wiess, Humble president, said the action was required "in fairness to those from whom Humble purchases oil and to protect badly needed supplies for Humble and its customers."

New price for East Texas crude is $2.15, highest in the field's history. Price of top-gravity crude on the Gulf Coast now ranges from $2.06 to $2.38. The top price of $2.08 was posted for the Fullerton area of Andrews County, in West Texas.

Several adjustments in gravity schedules and other changes were made with the new postings, and others were expected when more companies release detailed schedules. Deviations from the 20-cent pattern included:

Michigan, up 25 and 29 cents, bringing the price to a top of $2.39 and $2.43 as shown by Sohio Petroleum Co.'s postings.

West Texas, Devonian, 26-cent increase posted by Atlantic Refining Co., with the 20-cent raise followed on Ellenburger and Permian grades.

Kevin Sunburst and Cut Bank, Montana, gravity schedule established by The Texas Co. New schedule provides $2 a barrel for 29° gravity and below with a 2½ cent differtial upward to $2.27½ for 40 and above.

Delta crudes in South Louisiana, actually up 30 cents a barrel. The Phillips' boost caught Gulf Refining Co. in the process of removing the South Louisiana crudes to the schedule for Texas Gulf Coast crudes which automatically boosted the price from a top of $2.08 to $2.18—a 10-cent a barrel rise. Gulf met the 20-cent hike thereby giving South Louisiana crudes an increase of 30 cents.

Sunray, Mission, Pacific Western Merger Plans Are Confirmed

OFFICIAL confirmation of plans for the merger of Pacific Western Oil Corp. and Mission Corp. into Sunray Oil Corp. was given in an announcement October 19 by heads of the three companies involved.

Consummation of the merger plans will give Sunray approximately 59 per cent stock control of Skelly Oil Co., but this company is expected to continue as a separate organization and a Sunray subsidiary.

Statements released in Tulsa by C. H. Wright, Sunray president, and in New York by David T. Staples, president of Pacific Western and Mission, gave the first official information on the much-discussed plan to consolidate the companies. Details of assets and properties of the companies and the various stock holdings were published in The Oil and Gas Journal, October 11, page 44.

Stockholders of Sunray will meet December 5 to confirm the merger proposal, and those of Pacific Western and Mission, December 6. At a meeting of stockholders of Skelly Oil October 18, five new members of the board of directors were elected: Arthur M. Boal, Mission vice president; S. E. Cavanaugh, Pacific Western counsel, O. M. Evans, Pacific Western vice president; Edward Groth, Pacific Western director; and Staples. They replaced five officers of the Skelly company who previously had held places on the board.

W. G. Skelly, Skelly president; C. C. Herndon, executive vice president; A. J. Dockweiler, a director of Mission; Emil Kluth and Ferro Williams were reelected to the Skelly board.

The enlarged Sunray company will consolidate in its Tulsa headquarters the offices maintained by the other two companies at Reno, Nev., and Bayonne, N. J.

Wright's statement follows:

"The merger terms provide that each share of Mission will be converted into six shares of common stock of Sunray. Each share of Pacific Western not purchased by Sunray will be converted into seven-tenths of a share of new $100 par value, 4½ per cent prior preferred stock of Sunray and each share of presently outstanding preferred shares of Sunray will be converted into one share of such new prior preferred stock of Sunray.

"The shares of common stock of Sunray now outstanding in the hands of present stockholders of Sunray will remain unchanged.

"Sunray has entered into an agreement with the holders of approximately 85 per cent of the capital stock of Pacific Western to purchase from them at $68 per share their holdings of capital stock of Pacific Western, conditioned among other things, on the confirmation of the merger, the obtaining of tax closing agreements, the transaction being consummated prior to December 23, 1947, and the completion of proposed financing being arranged through Eastman-Dillon & Co., and Sunray has agreed to give minority stockholders of Pacific Western an opportunity to sell their shares at the same price.

"Upon the confirmation of the merger Sunray will own all of the capital stock of the Getty Realty Co., which owns and operates Hotel Pierre in New York City, and will also own approximately 59 per cent of the stock of Skelly Oil Co.

"Among the assets to be acquired by Sunray Oil Corp. is approximately 30 per cent of the common stock of Tide Water Associated Oil Co., negotiations for the sale of which are under way."

Officials Defend Aramco Export License at Wherry Hearing

WASHINGTON. — Sudden and unexpected changes in the world oil situation prompted the Interior Department to abandon its original position of opposition to the export of pipe for the Saudi Arabian pipe line and give its approval last month to a license for the shipment of 20,000 tons during the current quarter, it was disclosed last week by Max W. Ball, director of the Oil and Gas Division.

Striving to make his position clear under nearly 2 hours of the sharpest kind of questioning by Sen. Kenneth S. Wherry of Nebraska, chairman of the oil subcommittee of the Senate special small-business committee, who is definitely opposed to any export of pipe whatever so long as the domestic industry needs supplies, Ball explained that in July he had recommended against issuance of the export license but by September had been forced to reverse himself because of new developments.

Those developments, he said, were a disconcerting deterioration of the tanker situation, almost on the heels of a report by a National Petroleum Council committee that the tanker supply was fairly easy and showed no indications of trouble, and the determination, in making studies for the Marshall plan, that world requirements by 1951 would be 10,000,000 bbl. daily and world supply, at best, would be barely that volume and, even with the use of all the vessels now available in operation or tied up and the new tankers to be constructed, the number of tankers, world wide, would be barely enough to move that oil and probably would be somewhat short.

For these reasons, Ball told Wherry, the Saudi Arabian pipe line was felt to be justified, even though it meant taking needed steel away from the domestic industry.

Tanker Situation Tight

The tanker situation already is so tight that the Maritime Commission is making available this month only 46 per cent of the capacity required for coastwise transportation and despite all efforts probably will not exceed 75 per cent of requirements next month, Ball declared.

Much of Wherry's questioning was aimed at bringing out that the government officials who passed on the license application did not bring any industry representatives, and particularly independents, in for advice, and he was particularly insistent upon Ball's failure to have the NPC go into the matter before acting on the application, dismissing the latter's explanation that the council's method of procedure did not permit of the setting up of a committee and the making of a study within the limited time available. At best, he indicated, a committee could not have been appointed until the October meeting, nearly 3 weeks after the decision was made, and could not have reported until the next meeting in January.

Earlier in the hearing, Russell B. Brown, general counsel of the Independent Petroleum Association of America, told Wherry that despite repeated appeals to the secretaries of commerce, interior, and state and the chairman of all House and Senate committees interested in oil, the departmental committees which passed on the application failed both to call on industry representatives for information regarding the pipe situation or to make any clear explanation of the factors on which they based their decision to permit the exportation of pipe.

Schroeder Gives Testimony

Before he closed the hearing, Wherry had Dr. W. C. Schroeder, chief of the Office of Synthetic Liquid Fuels, explain the possibilities of synthetic production, and demanded to know why steel was not being allocated for commercial production of oil from coal, although Schroeder indicated the tremendous cost of building up such an industry.

Schroeder explained that gasoline can be produced from natural gas at about the same cost as from petroleum now, but said that the oil from shale is of poor grade and would cost $2 to $2.50 per barrel for a product comparable to $1 or $1.40 petroleum. Any oil product and any grade may be produced from coal, he said, but at a cost, for gasoline, 3 to 5 cents per gallon more than from petroleum.

To establish a coal hydrogenation industry capable of producing 1,000,000 bbl. daily, he said, would necessitate the production of 225,000,000 tons of coal annually, requiring about 150,000 men in mines and plants and calling for 10,000,000 to 11,000,000 tons of steel.

Appearing before Wherry on 18 hours' notice, James Terry Duce, vice president of Arabian American Oil Co., stoutly resisted insinuations that he had attempted to "influence" anyone in the Government in behalf of the application for pipe.

All the "influencing" he did, Duce declared, was to lay the facts of his case before officials. When he talked with Ball in August, he said, he did not even know the latter had previously opposed granting the license.

In his effort to make a case, Wherry went back to Duce's service with Petroleum Administration for War. Duce testified that he was paid $7,000 a year by the Government, and his company made up the difference between that and his $15,000 salary so as to have option on his services after the war. He now gets $30,000 a year, he said.

Civil Service Official Called

Wherry called two officials of the Civil Service Commission, one of whom read the federal statute prohibiting a government official or employe from receiving any salary in connection with his services from any person or corporation, and declared it was a "revelation" when Duce said it was a common practice in PAW and the War Production Board for men to receive salary from firms from which they were on leave. The matter was cleared with the attorney general in each case, Duce said, terminating Wherry's efforts to make it an issue.

Wherry also brought up the report that Duce told export control officials that if the license was not granted, the pipe for the line would be stacked. Duce explained he had told them it "could" be stacked, but had not said it would be done. "We couldn't find enough yards on the Pacific Coast to stack it," he added.

Duce testified that it would take about 59 T-2 tankers to move the 300,000 bbl. of oil which the line will carry initially and 85 to 88 to match the 400,000 bbl. daily to which it can be boosted. The 59 tankers, he said, would require about 337,000 tons of steel, some 30,000 more than required for the pipe line and, he added, tanker experts have estimated there will not be enough tankers to move the world's oil requirements by 1951. when the line is to be completed. *(For comment on this hearing, see Watching Washington, page 78).*

T. G. T. Proposes Third Loop, Line to Boston

WASHINGTON. — Tennessee Gas Transmission Co. has applied to the Federal Power Commission for authority to install a third loop and extend its line to Boston, Mass.

T.G.T. is already constructing a line to its West Virginia terminus to increase its capacity to 600,000,000 cu. ft. daily. It now seeks a certificate to increase this to 1,055,000,000 cu. ft. and to extend its line through Ohio, across the northwest corner of Pennsylvania to Buffalo, through the Mohawk Valley to Albany, and across Masachusetts to Boston. It also seeks a spur into Pittsburgh and necessary gathering lines to tap new gas supplies in Texas.

New officers of the American Association of Oilwell Drilling Contractors at the speakers' table during a luncheon held for their installation. They are: N. H. Wheeless, Wheeless Drilling Co., past president and member of board of directors; A. H. Rowan, Rowan Drilling Co., member of board of directors; C. J. Paine, F. B. Paine Drilling Co., treasurer; J. Doyle Settle, A.A.O.D.C., secretary; George S. McQueen, McQueen & Clevenger Drilling Co., vice president for West Texas and New Mexico; J. Zeppa, Delta Drilling Co., vice president for Cretaceous and Tertiary basins; Brad Mills, A.A.O.D.C., executive vice president; E. C. Brown, Brown Drilling Co., president; J. E. Warren, Carl B. King Drilling Co., retiring president and member of board of directors; D. H. Graham, Dunlap & Graham Drilling Co., vice president for California; J. E. Brantly, Drilling & Exploration Co., past president and member of board of directors; Reese H. Taylor, president of Union Oil Co. of California, guest speaker; W. T. Payne, Big Chief Drilling Co., past president and member of board of directors; and Sam Grinsfelder, vice president of Union Oil Co. of California

Drilling Contractors Hampered by Pipe Shortages, Rising Costs

by Herndon David

LONG BEACH, Calif.—Shortage of oil-country tubular goods, rapidly increasing drilling costs, and public-relation problems of the petroleum industry received major attention from nearly 750 representatives of drilling contractors, service and supply companies at the seventh annual convention of the American Association of Oilwell Drilling Contractors here October 13-15. Faced by a period of several "lean" years, the contractors subjected to careful study the costs of all phases of the drilling industry and the supply situation of tubular goods.

In an address before the association, J. E. Warren, retiring president, declared that the United States is "short" several thousands of wells which could not be drilled during the war years. Although the trend shows a steadily increasing number of wells being drilled each year since the war, only a portion of the number required by the industry have been drilled. Unless the supply of tubular goods is increased, contractors cannot hope to increase drilling to the required rate.

"It is not believed," said Warren, "that the present demand is temporary. It is a permanent situation, and the steel and manufacturing industries must increase their facilities for the manufacture of tubular goods if the drilling industry is to drill a sufficient number of wells each year."

Warren drew attention to the fact that, on the surface, the strong indication of a continuation of the upward trend in drilling points toward a period of good business at adequate profits for the drilling contractor. He warned, however, that contract drilling is now at the peak of a business cycle and is headed for a slump. He explained that although higher drilling efficiency and greater drilling activity have increased the gross revenue earned by contractors, the rapid spiral of labor, supply, and equipment costs are making it more and more difficult for the contractor to earn any profit from his operations. "In the face of advancement in cost of supplies alone," he declared, "drilling is being done at contract prices below cost in many instances. A careful study of all costs, based on the cost of replacement at the present time, must be made, and the contractors must band together in the association and cooperate to a greater degree than at any other time in the history of the organization if they are to survive the lean years ahead."

Reese H. Taylor, president of the Union Oil Co. of California and featured guest speaker at the convention, declared in his address that the entire petroleum industry, including the drilling industry, is in jeopardy due to many misconceptions of the people concerning the industry.

Five General Sessions

The 3-day conclave of contractor supply and service-company representatives consisted of five general sessions. At the first of these, the assembly was addressed by the retiring president, J. E. Warren, and then was told of contracts between the city of Long Beach and various oil companies, the exploitation, geology, development and production operations of Long Beach Harbor Oil properties in three papers of general interest. These were: "Unique Provisions of Long Beach Harbor Oil-Development Contracts" by Irving Smith, Long Beach city attorney; "Exploitation of Long Beach Harbor Oil Properties" by Frank Hardesty, petroleum development engineer of the harbor department; and "Production Operations of Long Beach Harbor Oil Properties" by John Rumbaugh, petroleum production engineer of the harbor department. Following the three papers, W. R. Martin, chairman of the Long Beach Harbor Commission, conducted a boat tour of the Long Beach Harbor and the oil developments in that area.

The second general session was concerned entirely with committee reports and was presided over by A. H. Rowan, Rowan Drilling Co., Fort Worth. Reports of progress made by five separate committees during the past year were read during the session. These included the reports of the rotary drilling committee by C. W. Alcorn, research and educational committee by Howard P. Holmes, safety and insurance committee by William Broadhurst, publications committee by J. E. Brantly, and accounting committee by William D. McBee.

At the third session Martin E. True, Humble Oil & Refining Co., Houston, presented a technical paper on "Automatic Drilling Control." *(True's paper will be published in The Oil and Gas Journal's issue of November 1).*

K. A. Wright, of B. & W., Long Beach, discussed "Effect of Hole Enlargement on Cementing and Completion Practices." At the fourth general session, J. D. Spalding, National Supply Co., Torrance, Calif., discussed "The Drilling Situation Today," and John M. Forline, labor-relations consultant, Los Angeles, spoke on "Manners of Management."

The final session included a paper by Wiley B. Noble, Reed Roller Bit Co. *(Noble's paper was published in The Oil and Gas Journal, October 18, page 118).*

this week

PRICES—Action of Phillips Petroleum and Southern Minerals touches off general 20-cent crude-oil price advance in Mid-Continent, Southwest, and Rocky Mountain areas. . . . Oklahoma-Kansas 40° gravity and above now $2.15, highest in 21 years. . . . Michigan postings up 25 and 29 cents with some other deviations from the 20-cent pattern noted elsewhere. . . . ¶Products prices quickly turn upward following the crude hike announcements. . . . Tank-car prices up generally 1/2 cent on gasoline, 3/4 cent on burning oils. . . . Indiana Standard boosts midwestern tank-wagon prices on major products 4/10 to 1 cent, including 8/10 cent on gasoline and furnace oils. . . . Higher prices show little sign of deterring premium and bonus payments, both for crude and products. . . .

INTERNATIONAL—Turkish agency signs 2-year contract with Drilling and Exploration. . . . Tests expected to start soon following arrival of four rigs and crews in Ankara. . . . ¶Oil-company-financed scientific expedition recovers marine fossils in Peruvian Andean region.

GOVERNMENT—Secretary Krug reveals he is proposing cooperative government-industry program to spread equitably heating-oil supplies among consumers this winter. . . . Krug makes disclosure in press conference at which he also says his report to the president indicates the nation's petroleum exports to Europe under the Marshall plan will not greatly exceed present levels. . . . ¶Senator Wherry calls Max Ball, Terry Duce before his small-business subcommittee in his attack on the Government's approval of an export license for pipe to begin the Trans-Arabian pipe line. . . . ¶Interdepartment government fight reported over the amount of petroleum products to be licensed for export in the fourth quarter. . . .

NATURAL GAS—Tennessee Gas Transmission makes application to FPC for authority for a third loop to its system and for an extension to Boston. . . . ¶Transcontinental Pipe Line reveals plans for Texas-New York line in advance of FPC hearing on project to open October 27. . . . ¶New Colorado Interstate 20-in. line from Hugoton field opened in ceremonies in Denver. . . . ¶Speculation heard over possibility that Texas Eastern Transmission will loop the Big Inch system. . . .

RESEARCH—Cities Service announces organization of Cities Service Research & Development Corp. as central research agency. . . . New company will conduct research in all phases of petroleum, including synthesis of liquid fuels. . . .

STATISTICAL—United States crude production reaches another record week ended October 18 with average of 5,283,050 bbl. daily. . . . California output at new record high of 929,450 bbl. daily, The Oil and Gas Journal tabulation shows. . . . Well completions week of October 18 total 743 against 710 the previous week. . . . Total includes 119 wildcats, compared to 96 completed the week earlier. . . . ¶Refinery runs continue at high level with A.P.I. report for week ended October 11 showing average runs of 5,296,000 bbl. daily. . . . Gasoline production during same week totals 16,519,000 bbl. . . .

SUPPLY AND DEMAND—Bureau of Mines reports third-quarter demand probably exceeded earlier estimates by about 2 per cent. . . . ¶Texas Railroad Commission continues exemption from shutdown days in November except for East Texas which was cut to 20 days because of reservoir-pressure decline. . . .

Providing a pipe-line outlet for Western Canada's new Leduc field, near Edmonton, Alta., necessitated spanning the 500-ft. wide, 200-ft. deep White Muddy "coulee." Left are the towers under construction for the suspension bridge which will support the pipe. Right, the discovery well, completed last February, is being blown around the separators to clean it of accumulated wax. These photographs were taken by Neil Williams, The Oil and Gas Journal engineering writer whose accounts of the Leduc development will appear in forthcoming issues of the Journal

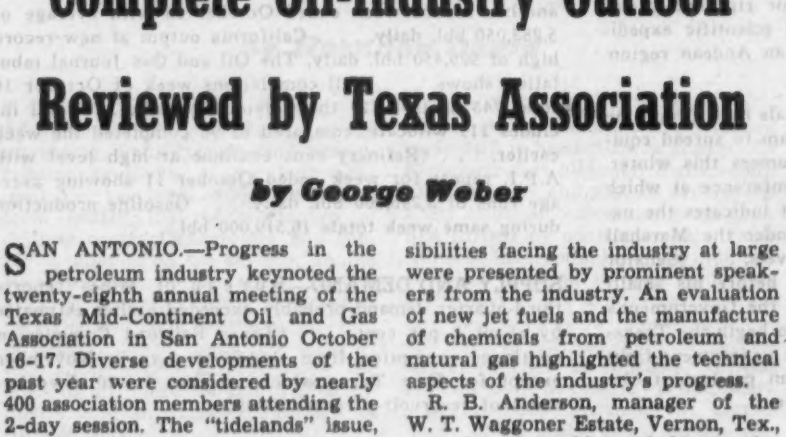
R. B. Anderson, manager of the W. T. Waggoner Estate of Vernon, was elected president of the Texas Mid-Continent Oil and Gas Association, succeeding Fred W. Shield, San Antonio oil operator. All other officers were reelected. Above are: Charles E. Simons, Dallas, vice president and general manager; Claude B. Hamill, Houston, vice president of the Gulf Coast district; J. L. Collins, Corsicana, vice president, East Central Texas district; Anderson; Shield; Al Buchanan, San Antonio, vice president of Southwest Texas district; and Andrew Howsley, general counsel. Not shown are: Eugene McElvaney, Dallas, treasurer; B. G. Byars, Tyler, vice president, East Texas district; J. H. S. Bonner, Wichita Falls, vice president, North Texas district; Cecil O'Brien, Amarillo, vice president, Panhandle district; B. L. Lefever, Big Spring, vice president, West Texas district; and Tom F. Grisham, Abilene, vice president, West Central Texas district

Complete Oil-Industry Outlook Reviewed by Texas Association

by George Weber

SAN ANTONIO.—Progress in the petroleum industry keynoted the twenty-eighth annual meeting of the Texas Mid-Continent Oil and Gas Association in San Antonio October 16-17. Diverse developments of the past year were considered by nearly 400 association members attending the 2-day session. The "tidelands" issue, governmental control, pipe shortage, and the production job and responsibilities facing the industry at large were presented by prominent speakers from the industry. An evaluation of new jet fuels and the manufacture of chemicals from petroleum and natural gas highlighted the technical aspects of the industry's progress.

R. B. Anderson, manager of the W. T. Waggoner Estate, Vernon, Tex., was elected president of the association, succeeding Fred W. Shield, San Antonio oil operator. All regional vice presidents and administrative officers of the association were reelected. In addition, 20 new members were named to the board of directors.



Among those prominent at the association's twenty-eighth annual meeting were: H. A. Murray, The Texas Co., New York, who spoke on jet fuels; W. A. Moncrief, Jr., Fort Worth, and Edwin L. Cox, Dallas, who presided at two of the sessions; Maston Nixon, executive vice president, Southern Minerals Corp., Corpus Christi, and Walace Hawkins, general counsel, Magnolia Petroleum Co., Dallas, who received the association's Distinguished Service Awards for 1947; Robert G. Dunlop, president, Sun Oil Co., Philadelphia, who addressed the association on "Oil's Stewardship"; and John G. Pew, vice president, Sun Oil Co.

Accomplishments Reviewed

In the opening address, President Fred W. Shield reviewed the work of the association during the past year. He commended the Texas governor and legislature for their "no new tax" position. Services of the association were tendered to the state legislative committee which is studying methods for improving the educational system of Texas.

Reviewing the progress made in conservation of oil and gas in the state, Shield cited the fact that there are fields in Texas where pressure maintenance operations are highly desirable. In this unsolved problem he expressed confidence that the operators, the Railroad Commission, and the legislative and executive branches of the state government would find a proper and equitable solution whereby orderly field development may follow where joint operating argeements are necessary.

Federal Trends Examined

The many issues of federal Government affecting the states and the industry attracted considerable attention at the meeting. A comprehensive survey of the activities of the Eightieth Congress was presented the organization by Frank M. Porter, Oklahoma City, Mid-Continent Oil and Gas Association president, in his address "Operations Washington." Among the developments affecting the industry he reported new progress on the investigations involving congressional amendments to the Natural Gas Act.

Following statements made to the press by the Federal Power Commission concerning the effect the proposed amendments would have upon the ultimate price of gas to consumers, the Senate bill was returned to subcommittee at the close of the congressional session for further hearings. Porter reported that he had been advised "that the Independent Natural Gas Association through its members and other gas companies are now engaged in making a survey of the market price of gas in all the major gas fields of the country, calculated under the method provided for in the Rizley bill, and the volume of gas being delivered from these various sources of supply into natural-gas pipe lines serving the representative consuming centers referred to by the FPC in its statements furnished to certain newspapers. When this information has been assembled, it will be turned over to consulting engineers and economists not connected with the gas industry, for the purpose of determining what effect, if any, the law would have upon ultimate consumer rates. It is

also my understanding that when the survey has been completed, the Senate subcommittee has announced it will reopen the hearings for the purpose of receiving further testimony from both the Commission and the gas industry."

With respect to the tidelands issue he reported a new and interesting strategy believed planned by "proponents of federal control." "There seems to be evidence," Porter said, "that the Department of Justice and the Department of Interior are now joining in a move to exclude all issues from the tidelands question except oil and other minerals. It is generally understood that the Justice and Interior departments are working on a proposed bill to be offered to Congress at the next session. On the basis of rumor, the bill will convey to the states all rights and interests of the federal Government in these lands, except the oil, gas, and other minerals. By such move, it is said that these departments hope to eliminate all support for any legislation that would convey absolute fee title to the states, except the states now producing or which may expect to produce oil or other minerals from these lands."

Gov. Millard F. Caldwell of Florida reviewed the tidelands issue in full. He brought the issue of inland waters to the attention of the association, stating that inland waters in American jurisprudence have not received definitive attention. The possibility was suggested that the water of the Gulf of Mexico may be held to be inland waters, and as such, exempt from federal control by a previous Supreme Court decision. He stated his certain belief that the states bordering the Gulf would insist that it is a body of inland water, and that contention will be the origin of considerable litigation between those states and the United States unless Congress takes the necessary steps to clear the matter.

Industry Policy

Two prominent oil company officials addressed the meeting on matters of oil industry policy. Speaking on "Oil's Stewardship," Robert G. Dunlop, president of Sun Oil Co., cited the necessity for preserving the progressive; competitive nature of the oil business and the refutation of attacks being made not only on the oil industry but on the entire business structure of the country by "men who are collectivists at heart and whose purpose is to bring our economic system under the paralyzing hand of government dictation."

Swensrud's Discussion

Adequate profits, maintenance from centralized controls, and continued progress and improvement in conservation developments were defined as the three essentials of a healthy oil industry by S. W. Swensrud, executive vice president, Gulf Oil Corp., in his talk on "The Production Job of the Oil Industry."

The Gulf official, who prior to last June was executive vice president of Standard Oil Co. (Ohio), said there is every reason to assume that the oil demand trend will continue upward. A 10 to 15 per cent gain in demand, he pointed out, in the next several years will place domestic oil requirements well over 6,000,000 bbl. daily, exclusive of exports.

"At the present rate of 5,200,000 bbl. daily, the total production in a year is almost 2 billion barrels," he told the association. "Merely to keep up with that would require the discovery and development of the equivalent of 20 pools of 100,000,000-bbl. size, or 200 pools of 10,000,000 bbl." Swensrud mentioned the development time now required with deep drilling and complex geological structures, and said: "I think that anyone looking at the matter objectively, therefore, must conclude that in order to meet the increased consumption requirements for petroleum products in this country, it will be advisable to look to somewhat higher imports to supplement the highest desirable level of domestic production. . . ."

Swensrud said he did not believe the industry is now suffering from too much centralized control with the exception of a few problems such as the tidelands decision, the matter of Federal Power Commission jurisdiction, and continued large federal land holdings. In discussing conservation, he reviewed unitization progress and spoke critically of such impediments as the pending federal antitrust suit against the Cotton Valley operators. He said he felt that in most oil states in the matter of conservation, engineering progress has outrun the legal and legislative developments.

Texas Research Plan Proposed

Ernest O. Thompson, chairman of the Texas Railroad Commission, speaking on "Hidden Oil" submitted for the association's support, a program for a study and research program aimed at the secondary recovery of vast reserves of oil in place in old Texas fields. The program is a simple one, calling for legislative authorization and appropriation of $120,00 yearly out of the state's regulatory oil tax fund already on hand, to pay the salaries of 50 graduate engineers. Assigned to research work at the University of Texas and Texas A. & M. College, those engineers in the employ of the commission would supplement original study in secondary recovery with practical application to selected old fields in the state. It was suggested that by having engineers who are working on advanced degrees, apply their attention in small teams to 10 or 12 fields, that the investment in salaries would be returned manyfold in added recovery of crude oil at no additional expense to the taxpayers in increased levies.

Technical Papers

In a paper entitled "Jet Fuels for Aircraft," H. A. Murray, technical research division, The Texas Co., New York, discussed the development of Jet-powered military and commercial aircraft, and the resulting new fuel demands which the industry will face. The importance of advancements in compressor design, metallurgy, and knowledge of combustion were traced as important factors in bringing jet motors to their present state of development. In discussing jet fuels he stressed the importance of volatility, As regards availability of jet fuels, he stated that the estimated requirements in the future for military use would be several times (possibly as much as fourfold) that of aviation gasoline. Of the existing fuels, JP-1 or kerosine, shows an average yield of 6 per cent from crude. A wider boiling-point-range fuel, JP-2 shows 15 per cent, still insufficient in view of prospective demand. A new still wider boiling range JP-2 fuel promises yields of 35 per cent from each barrel of crude, and if all cracked fuels, whose value at jet fuels has not yet been fully determined, are included, a maximum yield of 55 per cent is possible.

W. P. Gage, vice president of Shell Chemical Corp., San Francisco, discussed chemicals from oil and gas in their true relation concerning supply in the chemical field and raw material demand in the oil and gas industry. In referring to the record of the petroleum chemical industry which turned out record wartime tonnages of ammonia, toluene, butadiene and aviation fuel components, he cited the tendency to overrate the effect of chemical conversion of petroleum fractions on the demand for natural gas, liquifiable gaseous fractions, and crude oil.

The current and future supply of oil-country tubular goods, a subject of high interest at the meeting, was discussed by A. E. Walker, Pittsburgh, president of National Supply Co. *(see page 87).*

Three resolutions were passed unanimously by the association at its closing session. Congress was requested to enact legislation removing the claim of the U. S. Government to tidelands. The Rizley bill was endorsed and members of Congress urged not to surrender responsibility rightfully theirs, to an administrative agency. Acting on the request of Thompson, the body also recognized that the Railroad Commission is understaffed with qualified engineers and experts and resolved to appoint a committee to study with that body, its actual needs for additional qualified men, and to recommend appropriate legislation to supply such needs.

International

WORLD-WIDE OIL DEVELOPMENTS

Drilling and Exploration Co. Signs Contract With Turkey

EDGAR CLAYTON, vice president of Drilling & Exploration Co., Inc., of Dallas, has signed a 2-year contract with the Turkish Mine Research Institute, according to a Reuters dispatch.

Four rigs and drilling crews are expected to arrive at Ankara shortly, this report states, explaining that tests are slated to get under way first in the Mardin section of Turkey, located approximately 48 miles from the Syrian border. Additional tests will also be made in the Adana Basin, near the northeastern end of the Mediterranean. Later tests will be drilled near Adana.

United Geophysical Co., of which Herbert Hoover, Jr., is president, has maintained an office in Ankara for quite some time carrying on work for the Turkish Government which prohibits private companies from doing any exploratory or development work for petroleum.

During this past summer, Max Thornburg, foreign oil consultant and former petroleum advisor to the U. S. State Department, made a detailed study of Turkey's natural resources for the Twentieth Century Fund. While the principal aims of this study will be to show Turkey how she can profit from the intense development of her resources, it is understood that the study will also point out that private companies from other countries and the Turkish Government could mutually benefit by close cooperation. Thornburg is now back in the United States working on his report.

The rigs, which will soon be operating in Turkey, will probably make tests from 5,000 to 6,000 ft. Currently Turkey has but a single oil well, this one located near Mardin. During the past 11 years the government has drilled less than 200,000 ft., and of this less than 65,000 ft. has been for oil.

Since the famed Chester concession was declared null and void by Turkey's former sultan more than 15 years ago, the government has been the only agency to engage in the search for oil and only lately have there been signs that the search is being intensified.

While in Ankara, Thornburg told a press representative that the general understanding of state control in Turkey ranges from a concept not so very different from the American idea as to the government's functions in safeguarding the public economic interest, on one hand, to a concept which in the United States, would be regarded as an extreme form of state socialism on the other.

Marine Fossiles Recovered By Permian Expedition

Rare marine fossils — about 4,000 lb. worth from 10,000-ft. Andian mountain ranges in Peru—which are expected to contribute greatly to knowledge of one of the world's potentially great crude-oil reserves in that country's Montana region, arrived in New York last week.

Dr. Norman D. Newell, professor of geology at Columbia University, headed the scientific expedition to the highest levels of the Andes Mountains. *(The Oil and Gas Journal, May 3, page 43).* Scientists from the American Museum of American History and the Instituto Geologico del Peru were also in the party. The expedition was financed by grants made by Standard Oil Co. (N.J.), Gulf Oil Corp., Shell Oil Co., and Socony-Vacuum Oil Co., Inc.

Discovery of many of the fossils adds proof to the theory that the Andian range once lay under a shallow sea, Newell said. The expedition also found evidence that the same shallow sea once covered Texas and Oklahoma. The evidence was in the form of marine fossils of the same general type as found in these two states.

Three More Companies Seek to Join A.I.O.C.

At least three additional independent oil companies have submitted applications for membership in the recently organized American Independent Oil Co. headed by Ralph K. Davies, former deputy petroleum administrator for war.

Land men for A.I.O.C. are now in the Middle East and elsewhere in foreign countries. This company's management also visualizes operations at some future date within the United States — "in fact anywhere where we might find more crude oil," as one of its executives expressed the company's policy.

Meanwhile, B. L. Majewski, vice president of Deep Rock Oil Corp., confirmed in New York, the report that his company has joined A.I.O.C. *(The Oil and Gas Journal, October 4, page 43).*

Premium Reported in Tanker Shortage

Indicative of the tight current world tanker transportation situation is the fact that the Argentine Government recently paid a reported 50 per cent premium over United States Maritime Commission rates on a movement from the United States Gulf Coast to Buenos Aires.

The French Government, in its search for tanker tonnage, is said to be ready to pay a 35 per cent premium over Maritime Commission rates.

Substitute Fuel Studied

Conversion of huge quantities of molasses and other locally available organic materials into power alcohol to augment the inadequate supply of petroleum and other fuels from India and abroad is being considered seriously by the Bombay Government.

Four technical subcommittees representing the Bombay Provincial Prohibition Board have been asked to work out costs for making power alcohol from molasses.

French Gas-Oil, Gasoline Imports Show Decline

OF the 484,445 metric tons of crude oil imported by France in August, Venezuela supplied 186,854 tons, Iraq 96,811 tons, and the United States 79,542 tons. In July France imported 419,704 tons of crude oil. (A metric ton is equal to approximately 7.5 bbl.)

The United States remained France's chief supplier of lubricating oils in August, sending 12,558 tons out of a total of 13,680 tons.

Fuel-oil imports in August totaled 40,572 tons against 23,275 tons in July. In the list of suppliers headed by Venezuela with 22,258 tons, the United Kingdom took third place, sending 3,203 tons. Second on the list were the West Indies, supplying 13,229 tons.

Gasoline imports dropped in August to 54,597 tons, from the July level of 74,304 tons. Nearly half of this gasoline came from the United States, although the amount supplied—20,473 tons—was about 9,000 tons lower than the July figure. The other chief sources of France's August gasoline imports were Saudi Arabia with 8,435 tons, Venezuela with 6,764 tons, and Iran with 6,082 tons.

Gas-oil imports in August were cut by nearly 50 per cent, totaling only 7,160 tons compared with 13,417 tons in July. Imports from the United States dropped to 3,797 tons from 9,430 tons, while imports from Venezuela dropped to 638 tons from 12,82 tons; and imports from the West Indies to 1,853 tons from 2,687 tons.

The French Government has suspended the gasoline ration for non-priority motorists and cut the ration for priority holders by about 40 per cent. Little hope is being held out in Paris that the gasoline situation there will improve in the immediate future as the dollar position prevents increased purchases. Gasoline reserves, at the end of September amounted to only 130,000 cubic meters, or approximately 819,000 bbl., compared with 210,000 cubic meters, or approximately 1,323,000 bbl., earlier this year.

A Reuters dispatch from Paris estimates that the 40 per cent cut in gasoline rations to priority users will not only decrease taxi mileage by 50 per cent but also will severely restrict country bus services and the movement of lorries carrying foodstuffs and raw materials.

Shell Planning Rotterdam Petrochemical Industry

Plans for a large oil storage center and an oil-chemical industry at Rotterdam are now being made by the N. V. de Bataafsche Petroleum Mij., operating company for Royal Dutch-Shell, according to a Reuters dispatch from Rotterdam.

Name of the subsidiary of California Texas Oil Co., Ltd. *(The Oil and Gas Journal, October 4, page 43)*, which will build a 20,000-bbl. daily refinery at Rotterdam is Caltex Petroleum Mij. (Nederlands), N. V.

Colombian Council Studies De Mares Concession

Colombia's National Petroleum Council is now making a study of Tropical Oil Co.'s De Mares concession which—unless it is renewed—expires in August 1951. The council presumably will prepare a report to the government on the basis of Tropical's activities in Colombia and how

the company has helped improve economic and cultural conditions.

Tropical, which produces 53 per cent of Colombia's 63,252-bbl. daily output, will undergo close scrutiny by the following government officials: Dr. F. Mendoza, council president; A. Monino, gas engineer; J. Amorocho, production engineer; J. Vargas-Sierra, refinery engineer, and H. Latorre-Sanchez, chemical engineer. All of these men were appointed recently to the council's technical staff. The technicians will live at De Mares while completing the study.

Tropical, an affiliate of Standard Oil Co. (N.J.), employs 3,815 persons.

CORE DRILLING ON BIKINI

Core drilling, with several holes ranging from 300 to 2,557 ft. was carried out recently on Bikini Island under supervision of the United States Geological Survey in cooperation with the Navy Department. Coring served a double purpose of checking subsurface effects of the atom-bomb blasts and providing additional data on substructure of the coral islands.
(Picture courtesy George E. Failing Supply Co.)

Rising Production, New Refineries Top Venezuelan Developments

RECENT reports from Caracas dealing with a number of activities in the oil, governmental, and economic fields, all emphasize Venezuela's stature as the world's No. 2 oil-producing country.

Of interest to the petroleum industry are the following developments:

1. A new production record for Venezuela of 1,225,044 bbl. daily the week ended September 1.

2. Export by Venezuela during the first 7 months of 1947 of 14,768,366 bbl. of refined products, with the certainty that this will be vastly increased when refineries now under construction are completed.

3. Stepped-up exploratory activities, with totals for the first 8 months of 1947 showing 502 wells completed, of which only 51 were dry.

4. Publication of the government's new budget, highest in Venezuelan history and an estimate of revenue for the current fiscal year in which the petroleum tax accounts for about a third of the total.

5. Announcement of a contract between the Venezuelan Government and a Portuguese company showing that the government is continuing with plans to sell at least a part of its royalty oil at premium prices.

6. Approval by the Venezuelan National Constituent Assembly of a plan authorizing the government to borrow up to Bs. 100,000,000, a large part of which will be spent in clearing obstacles to passage of ocean-going vessels into Lake Maracaibo.

International

New Production Records

The new oil production record of 1,225,044 bbl. daily the week ended September 1 compares to a previous record in the period August 5-September 1. Output during that period averaged 1,210,196 bbl. daily, up 19,668 bbl. daily from the average of the immediately preceding 5 weeks.

Record production performance by Venezuela's major producing companies, particularly the Shell group and Creole Petroleum Corp., were responsible for the national totals. Creole's output for the week ended September 1 reached 601,497 bbl. daily. On a weekly basis, this was the first time since the week ended February 17 that production exceeded the 600,000-bbl. daily average.

Several successive new weekly highs were set by the Shell companies, culminating in a record average of 351,916 bbl. daily the week ended September 1. Production at La Paz averaged 82,079 bbl, daily, making this field ranking only behind Bolivar Coastal as the country's largest producing area.

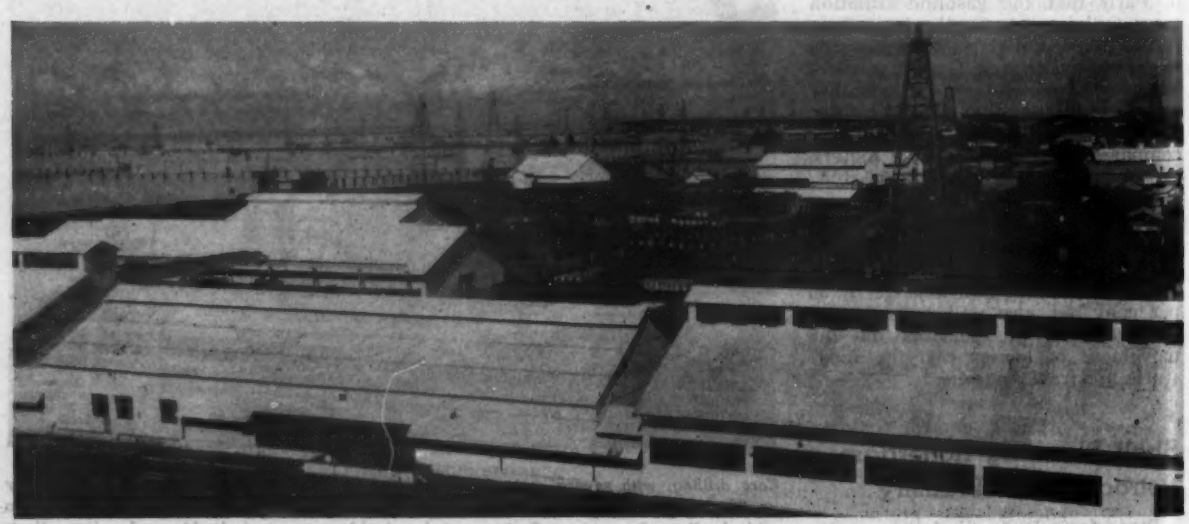
Other production records included Mene Grande Oil Co., 208,544 bbl. daily the week ended August 18 and Texas Petroleum Co., estimated production, 13,091 bbl. daily the week ended September 1.

A breakdown of production for the week ended September 1 showed that of Creole's total output, 443,319 bbl. daily came from the Lake Maracaibo region. Quiriquire produced 56,964 bbl. daily, and Jusepin, 49,672 bbl. daily. Of Shell's production, 192,928 bbl. daily was heavy lake crude. Mene Grande's total included 59,866 bbl. daily, lake heavy; 73,082 bbl. daily Guara; and 42,809 bbl. daily, Oficina..

Refinery Exports

In refinery operations for the 7 months ended July 31, Venezuelan plants produced 20,345,854 bbl. with exports totaling 14,768,366 bbl. Of the total refinery production for the period, greatest output was fuel oil, 13,344,928 bbl. Other products and the amount produced: gasoline and naphtha 2,189,354 bbl., kerosine 404,466 bbl., gas oil 26,858 bbl., diesel oil 3,850,492 bbl., asphalt 122,302 bbl., and other products, principally distillate, 275,157 bbl. Losses were 85,141 bbl.

Considerable progress is reported on the refineries being built on Paraguana Peninsula by Shell and Creole. Reports indicate work on the Shell



This scene at La Salina, Venezuela, shows some of the activity and operations in the "big middle" of the Lake Maracaibo area. Lake Maracaibo has hung up many records in recent years, and for the week ended September 1 produced a record total of 698,100 bbl. daily

refinery at Punta Cardon is somewhat more advanced than at Creole's refinery at Amuay Bay. Although deliveries of materials from England are slower than from the United States, it is expected the Shell installation will be the first to go in operation.

Shell has completed 12 out of a total of about 24 storage tanks, much of the road network, approximately 320 residential buildings, and a number of other structures. The first deep-water pier is now in use, and the second near completion. Some 6,000 workers are employed by Shell.

At Amuay Bay, about 8,500 tons of materials were delivered for Creole's refinery during August. With about 3,500 workers employed, the project is well along. Housing, though temporary, is near completion. Three tanks have been completed.

Exploratory Work

Exploratory activities in Venezuela also is reflecting the continued expansion of operations in the country. As of September 1, 30 rigs were reported on wildcat status. Operators and number were: Creole 4, Atlantic 2, Mene Grande 4, Mercedes 4, Texas 1, Phillips 3, Richmond 4, Shell 3, and Socony 5.

During the period August 5-September 1, a total of 73 wells were spudded in. Sixty-nine of these were development wells. The remaining four wildcats included two Richmond, one Shell, and one Atlantic. Of the entire total of 73 wells, operators and number were: Creole 21, Mene Grande 15, Shell 25, Texas, including Mercedes 7, Phillips 1, Richmond 2, and Atlantic 2.

The accompanying table shows completions for 8 months of 1947:

VENEZUELAN WELL COMPLETIONS

	Jan. 1—Sept. 1 completions			
Operator—	Oil	Gas	Dry	Total
Creole	162	3	12	177
Shell	143	..	..	143
Mene Grande	79	..	7	86
Consolidada	3	..	2	5
Texas, inc. Mercedes	32	1	8	41
Socony-Vacuum	17	..	4	21
Atlantic	2	..	3	5
Barnsdall	..	..	1	1
Phillips	6	1	10	17
Drilling and exploration	..	..	1	1
Richmond	1	..	3	4
British Controlled Oilfields	1	..	..	1
Total	466	5	51	502

While the oil industry in Venezuela has been moving ahead to new highs in the major branches of its operations, several developments in the government and economic field have again illustrated the importance of petroleum to the country and the attitude of the public in regard to oil.

Venezuela's New Budget

Budget data for Venezuela for the fiscal year 1947-48 was published late in August following approval by the National Assembly in July. The total, originally proposed at Bs. 1,199,500,000 was approved for Bs. 1,214,057,809, highest in the country's history, an increase of 54 per cent over the approved budget for the 1946-47 year and 14 per cent more than actual expenditures during the previous year, (one bolivar equals 30 cents.

The government estimates revenue at Bs. 1,099,928,500 for the current fiscal year against Bs. 1,095,286,000 actual revenue for the 1946-47 fiscal year. Major sources of revenue in the estimate, amount, and corresponding actual revenue for the 1946-47 fiscal year included (figures in bolivars): income tax 290,000,000, 233,335,000; customs duties, 149,600,000, 191,170,000; petroleum tax 400,000,000, 363,279,000; cigaret tax, 44,00,000, 44,618,000; and liquor tax, 52,000,000, 53,603,000.

The gap between the estimated revenue and the budget total will be met by withdrawals from government reserve funds of Bs. 114,129,309. As of June 30, 1947, these reserve funds total Bs. 230,035,688. Present Venezuela law allows the withdrawal of two-thirds of these funds to meet budgetary deficits.

Comment on the budget at the time it was under consideration varied. La Esfera, a conservative newspaper, declared the government should invest its funds carefully since the main source of revenue, petroleum, may be transitory. El Heraldo, criticized the withdrawal of funds from the reserve and asserted this money should be retained for emergency and that the government should "stop experimenting."

Royalty-Oil Contract

Royalty oil in the amount of 1,530,000 bbl. would be sold by the Venezuelan Government to S.A. Anonima Concesionaria de Refinacao de Petroleo em Portugal (SACOR) under contract which has been drawn up.

The Venezuelan Government, hoping to take advantage of the tight world crude market, began making plans months ago to take part of its royalty oil in kind from the producing companies. Eight offers were received last August after invitations to bid on some 35,000,000 bbl. over a 2-year period were issued by the Ministry of Fomento. Of the bidders, only two, Dale W. Moore Oil Co., a United States crude-buying company, and Petrol Terminal Corp., Philadelphia, made offers for quantities approximately that offered.

Earlier, it was reported the Venezuelan ministry had accepted two of the six foreign offers, one from a Brazilian firm and another from an Italian company. Some of the foreign offers involved barter arrangements.

The contract drawn up between SACOR and the Venezuelan Government provides for 800,000 bbl. Quiriquire crude, 19° gravity, at Caripito terminal, 600,000 bbl. Oficina mixed crude, 38° gravity, at Puerto La Cruz terminal, and 130,000 bbl. Tia Juana and Bachaquero crude, 14.5° gravity, at Las Piedras terminal. These deliveries are to be made in approximately equal amounts over a 2-year period with premiums of 20.5 cents, 18 cents, and 12 cents, respectively, for the three types.

Maracaibo Bar Project

The Maracaibo bar project was discussed in Caracas early this month by Dr. Juan Perez Alfonso, the minister of fomento, following his return from a trip to the United States. He said the Bs. 102,000,000 which the work will cost would be paid through the benefits derived by the petroleum industry.

According to reports from Caracas, canalization of the Maracaibo bar up to a depth of 35 ft. would allow traffic of oil tankers with a capacity of 115,000 bbl. instead of the 40,000 to 50,000-bbl. capacity vessels used at present. Venezuelan sources said benefits of the bar project would be much wider than construction of an oil pipe line "which would function for the benefit of a single company producing only one substance."

While the national assembly authorized a loan up to Bs. 100,000,000 for public works, it was reported the executive branch of the government plans a Bs. 200,000,000 program, including in addition to the Maracaibo bar canalization, Bs. 16,628,300 for port works of Guanta, Bs. 9,921,951 port works of Maracaibo, and Bs. 59,964,071 for port works of La Guaira.

Exploratory Well Begun In Southern Palestine

Exploratory drilling operations have been started at Gaza, in southern Palestine, by Petroleum Development, a subsidiary of Iraq Petroleum Co.

The new well is located about 15 miles northeast of Gaza which is in the northwestern tip of the Negeb, a part of disputed southern Palestine.

Iraq Petroleum Co. already has production in Iraq and is exploring in Lebannon, Syria, Qatar, and southern Iraq.

Leo Teyssot, French field manager for Petroleum Development, heads an organization of 35 specialists and 300 Arab laborers plus four American drillers. The company is planning another well at Kurnub, 50 miles east of Gaza.

The economics of TCC... AS APPLIED TO 16 REFINERIES

Here are 16 refineries, located in 9 states and varying in crude capacity from 3,000 BPD to 25,000 BPD. Houdry engineers analyzed the over-all operations of each of these refineries and projected the addition to it of T C C cracking.

The true measure of the earning power of T C C equipment is reflected in the low differential between the by-product cost of gasoline and the cost of crude. The resulting increase in earnings makes it possible for any of these refiners to retire T C C's low capital cost within a relatively short period of time.

Ask Houdry to demonstrate the profits from T C C installation in your refinery.

SUMMARY OF ECONOMICS FOR VARIOUS REFINERY PROJECTS

Refinery Analysis No.	Crude Capacity BPCD	Gasoline BPCD	Distillate Fuels BPCD	Residual Fuel BPCD	ASTM Octane No.	TEL Ccs/Gal.	Crude Cost ¢/Gal.	By-Product Cost of Gasoline ¢/Gal.	Differential ¢/Gal.	Payout in Years
1	5,000	2,893	1,185	688	83.0	1.9	3.8	4.6	0.8	1.4
2	5,000	2,848	600	1,428	83.5	1.3	3.0	5.0	2.0	2.2
3	5,000	3,281	1,239	286	77.5	1.7	4.2	5.1	0.9	3.5
4	3,000	1,206	870	914	79.0	1.3	4.6	4.9	0.3	2.3
5	6,000	3,673	1,080	1,036	77.5	0.7	3.2	4.2	1.0	3.7
6	4,000	2,842	320	604	79.0	0.7	3.2	4.7	1.5	3.6
7	6,000	3,992	.....	1,566	82.5	0.9	3.0	5.1	2.1	2.9
8	4,000	2,610	400	753	78.0	0.5	3.1	4.6	1.5	2.9
9	12,000	7,787	1,800	1,602	81.0	1.5	2.8	4.0	1.2	1.1
10	5,330	3,812	.....	1,032	80.5	0.5	2.9	4.5	1.6	3.3
11	22,500	15,562	2,250	3,004	80.0	0.6	3.9	5.1	1.2	2.3
12	12,000	5,969	1,025	4,612	82.0	1.1	2.5	3.6	1.1	2.5
13	10,000	5,110	3,963	574	78.0	0.5	3.5	3.9	0.4	1.8
14	3,500	1,764	525	1,069	80.0	1.1	3.1	4.7	1.6	2.2
15	9,000	4,663	2,375	1,662	76.0	0.6	4.6	5.1	0.5	2.2
16	6,750	4,473	1,991	783	81.5	1.5	3.9	4.7	0.8	1.7

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HOUDRY CATALYTIC PROCESSES

Research Is Industry's Third Dimension, Vagtborg Tells N.L.G.I.

by Arch L. Foster

CHICAGO.—Research is the "third dimension" for the world's industry, by which more new things are created from available raw materials, Harold Vagtborg, president, Midwest Research Institute, Kansas City, Mo., told the National Lubricating Grease Institute at its annual convention.

Vagtborg said research has increased so greatly since the turn of the twentieth century that we now have 3,000 scientific research laboratories in the United States alone. These laboratories employ upwards of 150,000 technically trained men and women, and the annual expenditures for research amount to a round billion dollars. Forty per cent of all industrial production at present has been developed entirely through research since 1900, and one-fourth of all employment now is in industries which have been created since that date, Vagtborg states.

Selling the American people on the worth and value of our competitive enterprise system is the No. 1 job of all American business, Henry L. Porter, sales promotion manager, Standard Oil Co. (Ind.) warned the grease makers. "Are we going to allow the collectivists, the leftists, the planned-economy brain trust, to outsell us?"

The technical phase of the meeting, under Carl Bolte, N.L.G.I. executive secretary, doubtless reached a new high at the convention with technical papers on various problems facing the technologists in their search for better lubricating grease materials and methods. Greasemaking must be reduced to a science, rather than carried on as an art, C. L. Johnson, president, Jerso Lubricants Co., Kansas City, Mo., told the technical session. Johnson discussed the developments which have been carried out at his plant to convert their operations to a short time-cycle system. Equipment for weighing all ingredients must be provided, he said; pressure-saponification mixing equipment must be adequate for all requirements, and a fast, high-temperature heating means must also be supplied if the modern methods for grease making are to be successful. Since time cycles are short, of the order of 2½ hours for soda-fiber greases and 1¼ hours for cup greases, the capacity of stirrer-equipped kettles found in most present-day grease plants is considerably in excess of that needed for the short time-cycle mehod of operation. Mixer kettles must be jacketed properly for low-pressure high-temperature heating.

Of the various metals employed in making soaps for grease compounding, only lead poses special considerations in compounding, S. B. Elliott of Ferro Chemical Corp. stated. This is due to lead's catalytic activity; it is known to be an active polymerization catalyst and especially unsaturated fatty acids are degraded rapidly for this reason. Research activities attempting to show some correlation between dipole-moment measurements on soaps and their activity indicate conclusively that the correlation found between these values and the peptizing activity of a soap is accidental and not direct, Elliott's researchers have found.

Various types of grease penetrometers are useful for comparing one grease with another but none give an absolute measure of anything so that the results cannot be used in any formulations, R. J. S. Pigott, Gulf Research & Development Corp. stated. A single exception to this statement exists, he said, the Standard Oil Development Co. pressure viscometer, which is open to two possible objections; first, the pressure measurement is not confined to the capillary tube alone, but includes flow resistance in the main chamber; second, the machine is once-through flow, and greases cannot be worked without removing them from the instrument. Pigott outlined the Gulf-developed machine which eliminates these objections, and which employs a double-acting cylinder and hydraulic drive mechanism.

Socony-Vacuum Group Hears Researchers

BEAUMONT, Tex.—A suggestion that major industries in this country draw up their own plans for peacetime atomic energy research, development, and application programs was made October 16 by Dr. Charles Allen Thomas, executive vice president and technical director of the Monsanto Chemical Co., St. Louis.

In an address before manufacturing and research executives of the Socony-Vacuum Oil Co., Inc., Thomas advised the petroleum industry to set up a concrete atomic-energy program and to seek permission of the Atomic Energy Commission for its undertaking.

In other addresses, two research experts—one representing the automotive industry and the other specializing in fuel synthesis—painted an optimistic picture of the gasoline situation with respect to future motoring. They were T. A. Boyd, of the Research Laboratories Division, General Motors Corp., Detroit, and P. C. Keith, president of Hydrocarbon Research, Inc., New York.

After pointing out that the Atomic Energy Commission has had little time to reflect on the commercial possibilities of atomic energy, Thomas asserted that the control organization's attitude toward industrial programs might well be favorable at the present time.

"I believe that industry should now take the initiative; and the petroleum industry with its advanced techniques and enormous resources, would be a good one to start the ball rolling."

Boyd predicted that future automobile engines with higher compression than at present, coupled with higher-octane gasoline, can mean many additional miles per gallon of fuel, while Keith disclosed prospects for "a gigantic synthetic gasoline industry which will have far-reaching ramifications."

After referring to a recently developed automobile engine with new high compression qualities which, it is claimed, can give gains of one-third or more in miles per gallon by comparison with a present-day engine of ordinary compression, Boyd asserted that this engine's octane requirements are "little if any higher than is represented by fuels which can be produced by practical processes now known." He predicted:

"It seems natural, therefore, to expect that the compression of automobile engines and the octane number of gasolines are due to rise in the future."

Keith described carbon monoxide and hydrogen as the building blocks of a special branch of the organic chemical industry which are to be the basis of the new synthetic-gasoline and diesel-fuel industry. He said raw materials for development of these building blocks are available in sufficient quantities and at such production costs that exploitation on a broad scale is a sound enterprise.

Partial and controlled combustion of natural gas with the use of oxygen has been developed to such a point where it has replaced the earlier and more costly catalytic reforming method of production, Keith said. The eventual production of 1 bbl. of finished liquid petroleum products requires the gross (fuel plus process) use of 10,000 cu. ft. of natural gas by this method.

WASHINGTON WATCHING

BY HENRY D. RALPH

"Tideland" Lease Revival

WASHINGTON.—Announcement by the Supreme Court earlier this month of its refusal to reconsider the California "tidelands" case appears to have been the signal for a drive by California oil interests, whose prewar applications for offshore oil leases were denied by former Secretary of the Interior Ickes before he was converted to the cause of government ownership, to upset the Interior Department's present stand that there is no authority in law for it now to act on such applications.

Former Sen. Burton K. Wheeler, (Mont.) has been retained as counsel for Joseph Cunningham, Glendale, Calif., who originally filed an application prior to 1934. In 1939, Cunningham set up the Shore Line Oil Co. to operate a lease should he secure one, and Wheeler is expected to file a suit to force the department to act on the application.

In another move, Robert E. Lee Jordan has appealed to Secretary Krug on behalf of five applications of his own and those of 17 other applicants.

Following the original Supreme Court decision last summer, the California applicants became active, and the department sought an opinion from the attorney general on its responsibilities, receiving a ruling that applications filed prior to the decision had no priority and, in fact, there was no statute requiring the land to be leased and no authority in law for the department to act on applications pending action on the question by Congress.

Confusion on Offshore Areas

Meanwhile, there is considerable confusion—some of it within the Department of Justice itself—over the future course of the offshore areas. Invited by the court to submit its recommendations for the decree which eventually will be issued, the State of California refrained from making any suggestions.

Now it is expected the court will invite the state and federal Government to make suggestions toward the carrying out of the decree, and the California authorities are expected to maintain their aloof position, apparently looking toward the enactment of quitclaim legislation by Congress.

Currently, the department is reported to be preparing two new cases for Supreme Court filing, dealing with the offshore lands of Texas and Louisiana, and it is known that there is a sharp difference of opinion among Justice Department officials both as to the bringing of those cases and the handling of the California situation. That controversy, while not the compelling issue, is known to have been a factor in the recent resignation of Douglas W. McGregor as assistant to the attorney general.

Senator Wherry at Work

THE most striking feature of the hearings on the export license for the Trans-Arabian pipe line has been the diligent efforts of Sen. Kenneth S. Wherry to look for "dirt" on even the rockiest soil and his quick retreat when badgered witnesses put him on the defensive.

Although he must have known the government decisions must be made by government officials and not in public forums, Wherry bullied Max Ball for not having asked industry members how he should decide on the license application, and made much of his failure to hold everything in abeyance until the National Petroleum Council could make a new study of the tanker situation.

Likewise, prompted by counsel and members of his staff, the senator sought unsuccessfully to show that James Terry Duce had violated the Federal Code by permitting his company to pay the difference between his government salary and that received from Arabian American, and when Duce refused to name others who did the same thing—and said truthfully that PAW and WPB had many men in that position—inferred that the witness was attempting to evade the issue. Duce told him all such cases in PAW were cleared with the attorney general, and Wherry switched immediately to another subject.

Wherry also tried to link Duce with the Ickes' plan to have the Government build the line, apparently in the hope of developing that as a government official he had opposed something that would be unhelpful to his company, but dropped the subject when Duce informed him he had completely withdrawn when any matter in which his company was involved came up in PAW.

The senator even read from a magazine article on what the company is doing in Saudi Arabia, to charge that great housing projects were being carried on abroad while people in this country were homeless. Reminded by Duce that it was necessary to provide comfortable quarters for the workers in Saudi Arabia, and that the housing developments were not in Transjordan or other countries through which the pipe line will pass, Wherry immediately found the idea splendid.

The hearings are to be continued, but it is unlikely any further sessions will be called until after the movie feature which the House unAmerican activities committee is staging this week. That hearing, concerned with Communist activities in Hollywood, will be conducted before 12 movie cameras, 24 "still" photographers, and 22 radio commentators, and there just won't be enough reporters to cover a rival show.

Conservation Conference

TWENTY-SIX officials from seven federal agencies have been appointed by Secretary of the Interior Krug as members of a technical working committee to assist in the planning of an International Scientific Conference on the Conservation and Utilization of Natural Resources to be held next year under the auspices of the United Nations' Economic and Social Council.

Krug himself will serve as chairman of the committee, which held its first meeting at the Interior Department October 16.

The projected conference, originally proposed by President Truman, will bring together representatives from all interested members of the United Nations for discussion of conservation and utilization of the world's natural resources. The hope in Washington is that all nations will participate, but there is some doubt whether Russia and her satellite countries will be any more willing to attend the meeting than they were to go into other meetings in which there were possibilities that disclosure or programming of internal matters might be brought up.

An Antitrust Defeat

AN appeal from the recent action of Judge Yankwich of the federal District Court at Los Angeles dismissing the government's civil suit against National City Lines, involving oil transportation, will probably be filed with the Supreme Court shortly after the turn of the year in a move by the Department of Justice to test the provisions of the Sherman and Clayton acts that such actions may be brought wherever the defendants may be found.

At the same time and also on motion of the defendants, Judge Yankwich

removed the collateral criminal case against National City Lines to Chicago.

An odd feature of the situation was that the same judge who decided against the government in these cases had upheld it in practically all of the preliminary motions involved in suits against Standard Oil Co. of California and Standard Stations, Inc., and Richfield Oil Corp.

Meanwhile, the department is watching a number of other oil cases pending in the courts, including the "Mother Hubbard" suit, where Justice Letts of the District of Columbia court heard argument October 1 on the government's objections to the Sun Oil Co. interrogatory and is expected to hand down a ruling any day.

In the Cotton Valley case, motions have been filed by some of the defendants for dismissal of the suit and by most of them for bills of particulars, and the court at Shreveport is expected shortly to set a date for argument.

DeGolyer Appointment

EVERETTE L. DeGOLYER, Dallas petroleum geologist, has been appointed to an advisory committee for exploration and mining set up last week by the Atomic Energy Commission to study its present program with respect to raw materials and advise on questions of exploration and development with a view toward integrating and coordinating present policies.

The committee met in Washington October 17 for its initial conference with Dr. John K. Gustafson, director of a newly established division of raw materials which will be responsible for exploration, development, and procurement of various types of raw materials required in the commission's program.

Fourth-Quarter Oil Exports

A BACK-STAGE interdepartmental battle revolved around the export quotas for petroleum for the fourth quarter of 1947, which is why they are so late in being announced.

It appears that some of the officials of various departments who assist the Office of International Trade in the export-license program professed not to have heard anything about possible shortages of petroleum products in this country and were inclined to be most liberal in granting practically all applications for export. Only after a long series of conferences were the requests "screened" down to a reasonable facsimile of what we can spare and what the importing nations simply have to have from us.

This situation is quite surprising in view of the terrific row raised by committees of Congress last spring when the export-control law was up for renewal.

Krug's Report on Resources

PETROLEUM exports to Europe under the Marshall plan will not greatly exceed their present level and will not constitute a serious drain on our reserves because they will be balanced by imports of crude, Secretary of the Interior J. A. Krug has concluded after a comprehensive study of natural resources and foreign aid just completed for President Truman.

Because of the large domestic demand it will be difficult if not impossible to increase net oil exports, but since this country's imports and exports of petroleum are now about in balance our petroleum problem will be 99 per cent in finding oil for domestic needs, the secretary told a press conference in explaining the report. To a certain extent, he added, Europe's needs can be met by importing more crude for refining in the United States and export of products, but for the most part Europe will have to look to the Caribbean and the Persian Gulf for increased supplies.

The resource study was prepared before estimates of European requirements were available, and it contains no figures on probable petroleum shipments. However, Secretary Krug declared that adoption of the Marshall plan will do no more than maintain petroleum exports at about their present level, which otherwise would fall off as European nations become short of dollar exchange.

Krug Calls for NPC Committee to Study Industry Action on Winter Supply

WASHINGTON.—Immediate establishment by the National Petroleum Council of a committee to consider the supply situation and determine whether the industry as a whole can act to relieve conditions was asked of NPC Chairman Walter S. Hallanan, October 21, by Secretary of the Interior Krug.

Krug pointed out that, unless the winter is abnormally warm, shortages will be widespread during the next 12 months, and the matter is of sufficient gravity to call for immediate consideration by the council.

The secretary acknowledged that legal limitations narrow the scope of the council's activities and made it clear that he is not asking it to devise or implement a program of concerted action within the industry. "I do, however, urgently request the views of the council as to general types of actions that can be taken individually by the various units of the industry to alleviate the situation," he said, "and its advice as to whether some form of concerted action would further relieve the situation."

Earlier, Krug proposed a government-industry program to spread available supplies of heating oil equitably among all customers this winter. He made this suggestion at a press conference dealing with his report to the President on national resources and foreign aid *(see page 78)*.

The secretary said he is not at all interested in any proposal to take oil away from companies which have it and give it to other companies which do not, but he does want to see some sort of plan to make sure that every consumer gets a fair share of what heating oil is available in his area.

Krug's suggestions followed the earlier meeting of the National Petroleum Council at which B. L. Majewski, vice president, Deep Rock Oil Corp., sought to have NPC take action to improve oil supply and distribution in view of the possibility of shortages during the coming winter.

Since the council considers only those matters cleared by its agenda committee and submitted by the Oil and Gas Division, Majewski was told to lay his proposal before OGD for possible later action by the council.

The Deep Rock official, who is A.P.I. vice president for marketing, October 15 released copies of a letter addressed to Max W. Ball, director of OGD.

Proclamation Suggested

"It is suggested that the President issue forthwith a proclamation urging all consumers to conserve petroleum products in all possible ways," he said. "At the same time, it is suggested that the President call upon the Oil and Gas Division and the National Petroleum Council, to formulate a program to mobilize the nation's petroleum resources in order to alleviate to the fullest possible extent the impact of the shortage confronting the nation," Majewski said.

He declared the plan should be cleared by the Department of Justice and should include coordination of transportation, equitable distrbution, study of maximum yields of distillate fuel oils, and possible lowering of motor-fuel octane.

Los Angeles A. I. M. E. Examines Reservoir Engineering

LOS ANGELES.—On October 23-24 the West Coast's petroleum engineers turned out en masse for the fall meeting of the A.I.M.E., petroleum division. Host was the Pacific petroleum chapter of the institute, and session place was the grand lodge room of Los Angeles' beautiful nine-story Elks Club. Planned under the meeting's general chairman, Sam Grinsfelder (Union Oil Co.), Dean Sheldon (consulting engineer), program chairman, and William C. Chonette (Shell Oil Co., Inc.) arrangements chairman, the four technical sessions embraced 11 engineering papers.

In discussing "Some Electrical Log Interpretation Problems," R. D. Ford of Long Beach and M. E. Loy of Bakersfield, both with Schlumberger Well Surveying Corp., presented seven type cases which illustrated California logging problems. First the authors reviewed established relationships between S (percentage of pore space filled with water), Ro (resistivity of a given sand 100 per cent water saturated), and Rt (true resistivity of the same sand when water saturation is S). The relationships all demonstrate that when water saturation decreases, the true resistivity increases. They stated that resistivity as shown by electrical logs is an apparent resistivity, which in most cases is not equivalent to true resistivity owing to factors including hole effect, bed thickness and electrode spacing. True resistivity is essential for a reliable quantitative analysis. Therefore, if more than a rough interpretation is desired, corrections must be made for the above-mentioned factors.

Major Change at Elk Hill

On Elk Hills field, Max C. Eastman and Comdr. F. L. Ruhlman, of the U.S.N. Naval Petroleum Reserve No. 1, Tupman, Calif., declared the war termination marked there a major change in field operations. Production was greatly curtailed, various experimental production projects were started, and a long-range exploratory program was inaugurated. Production was reduced from the wartime peak of 65,000 bbl. per day down to 8,000. a production rate deemed essential to carry on the experimental production projects. These projects are to determine best methods of maintaining the reserve, shut in, but in a state of readiness. Projects being investigated are protection of surface equipment, repair of wells which might damage the reservoir, gas injection, water encroachment, and gravity drainage. Exploratory drilling is being carried on in portions of the reserve.

"Limits of Uncertainty of Average Permeability and Unit-Volume Estimate of Oil in Place" was the topic of Jan Law, consulting engineer of Los Angeles. The average permeability and the estimate of original oil in place per unit volume occupy a dominant position among those factors critical to production performance. Establishment of the limits of uncertainty of these two quantities, Law said, is concerned with the limits of error associated with sampling. The problems were attacked by Law via the large sample method. In so doing, departures from elementary texts on mathematical statistics were made only in the use of the logarithm at a variable rather than the variable expressed in the units of measurement.

B. H. Sage and W. N. Lacey, of California Institute of Technology, Pasadena, described apparatus and a method for determining the volumetric behavior of hydrocarbons at pressures up to 10,000 psia. and at temperatures between 0° and 460° F. The equipment is suitable for measuring the total volume of the system and the volume of a liquid phase as functions of state within these ranges of temperature and pressure.

"California Oil Outlook" was the subject of R. L. Minckler, vice president of General Petroleum Corp., Los Angeles, and "A Method of Measuring Oil Pool Performance" was presented by Carlton Beal, consulting engineer of the same city. In addition, five papers which had been given at the Tulsa Mid-Continent meeting October 8-10 were delivered. These were by Henry J. Gruy and Jack A. Crichton on gas reserve estimates *(see this issue, page 88, for summary)*; Daniel Silverman and A. R. Brown on their new water-entry locator *(see Journal, October 11, page 55)*; Walter H. Munk on mechanics of wave action on structures (same); and Gordon Jackson and J. B. Murdoch, Jr., on "Planning a Multiple-Well Directional - Drilling Program for Offshore Locations" *(see Journal, October 18, page 133)*; and "Stresses About the Bore Hole of a Deep Well," by A. J. Miles and A. Dale Topping, of Missouri School of Mines and Metallurgy, Rolla.

Continental Wage Dispute Is Settled

An agreement calling for 24½-cent hourly wage increase between Continental Oil Co. and the Independent Oil Workers Union has settled a dispute in which the union threatened to strike at the Ponca City, Okla., refinery last month. The union demand was originally for a 28-cent hourly pay raise.

Texas' November Allowable Reduced

SAN ANTONIO.—At the conclusion of the November state-wide proration hearing held here October 15, the Texas Railroad Commission announced a reduction of 18,980 bbl. in the state's daily crude allowable for the coming month. The exemption from shutdown days was continued throughout the state except in East Texas field, where successive reservoir pressure declines of 5, 3, and 2 psi. followed the last pressure rise of 7.7 lb. in June. From 22 producing days in October, the field was cut to 20 producing days for November.

The state's November crude production allowable of 2,517,011 bbl. daily adjusted for estimated underproduction and additional production of natural gasoline and distillate, gives a net November daily withdrawal estimate of 2,531,000 bbl., nearly 21,000 bbl. per day higher than the U. S. Bureau of Mines estimate of demand from the state.

During the hearing, only one request was heard for more crude, when Phillips Petroleum Co. asked for an additional 10,000 bbl. daily for its Sweeney plant in District 3. In view of the casing shortage, a recommendation was made to the commission by Jake Hamon, Dallas, that a moratorium be set on drilling additional wells in East Texas field. Noting that such new wells do not add to available production, but result merely in reallocation of allowables, he asked that permits to drill be denied until the casing shortage is alleviated. E. O. Thompson, commission chairman, stated that body's responsibility of hearing all such requests and judging them on their merits, adding that permits which would increase drilling density beyond one well per 5 acres were not approved.

Announcement was made of a hearing to be called by the commission to consider revision of Special Field Rules 18 and 19 to conform with Rule 12 prohibiting contamination of fresh water sands by oil wells where such sands constitute sources of usable water.

The commission announced that as of October 11, the state had a total of 105,972 producing oil wells, a net gain of 39 from the previous week.

Current and Future Supply of Oil-Country Tubular Goods

Among the papers attracting the greatest interest at the meeting of the Texas Mid-Continent Oil and Gas Association last week in San Antonio was the discussion of pipe supply by A. E. Walker, president, National Supply Co., Pittsburgh. The discussion is presented here in a slightly abridged form (for other reports on the meeting, see page 66). Walker for 8 years has been president of National Supply and its affiliate, Spang-Chalfant, Inc., until the latter company became a division of National Supply. A 1910 graduate of the University of Michigan, he was for 20 years with Republic Iron & Steel Co., and its successor, Republic Steel Corp. He also spent 2 years as executive vice president of Pittsburgh Steel Co.

DURING the past 6 months I have talked to at least 40 or 50 oil company executives and purchasing agents. In the course of our conversation, one question always has been raised; namely, "When Will the Supply of Oil-Country Tubular Goods Be Equal to the Demand?" In no case have I attempted to name the approximate time when such a condition will exist. Anyone who tells you when the supply of oil country goods and line pipe will be in balance with demand, is only guessing. Being unable to give you the answer to that question, I will endeavor to tell you as much as I can about the current situation with respect to pipe, and the outlook for the next few years.

No doubt you would like to know if the supply of steel were unlimited, could tube mills now in operation furnish all the pipe needed by the oil and gas industry. After consulting several competitors, I am satisfied that the supply of pipe would be increased if the supply of steel were unlimited, but I cannot say that the demands of the oil and gas industry would be satisfied.

It is probable that 33,000 or 34,000 wells will be completed this year, with a total footage of approximately 118,000,000 ft. In addition to that, the industry is seeking an enormous tonnage of line pipe. If the tube mills could secure an unlimited supply of steel it might be possible to furnish enough pipe to drill somewhere between 35,000 to 40,000 wells, with a total depth of 140,000,000 to 150,000,000 ft.

The Steel Situation

If I am correctly informed, that would not satisfy the present demands of the oil and gas companies. Since the supply of pipe is partially limited by the supply of steel, I would like to discuss the steel situation.

Please understand that, while my company is a substantial producer of pipe, we do not manufacture steel, other than a limited tonnage of electric-furnace steel at our Pacific Coast plant, none of which is used to manufacture pipe. Since we are not manufacturers of steel, it is not necessary for me to defend the steel industry, or make a case for them.

If you are handicapped by an insufficient supply of pipe, we are not getting all the steel we need and, to that extent, your problem is ours. It is not my purpose to condemn the steel companies, although certain politicians have attempted to make a "whipping boy" of the industry and blame them for all shortages and high prices. I will try to give you the truth, as I see it, and such facts as I have been able to assemble.

The rated steel capacity of the country this year is 91,890,560 net tons of ingots, which will produce about 65 to 66 million net tons of finished product. This is substantially more than half of the world's production, and to show you how the industry has expanded, present ingot capacity compares with 44,452,000 tons in 1914; 71,438,500 tons in 1929, which was the greatest boom year of the twenties, 78,148,374 tons in 1937, which was the best year in the thirties; 81,619,500 tons in 1940.

Let me call to your attention that present enormous demand for steel follows almost 10 years of depression, in which consumption of steel was subnormal; and more than 4 years of war production, in which steel was diverted from peacetime uses into the production of armament. It also followed the period after V-J Day, when labor let down; and 1946, when 18,000,000 net tons of ingots were lost as a result of coal strikes, steel strikes and power strikes; and I should add that a substantial tonnage (I do not know how much) of steel and pipe was lost in the winter of 1946 and 1947, as a result of fuel shortage; and only as recently as last month, 16,000 tons of ingots per day were lost for over 2 weeks, as a result of a wildcat strike on a connecting railroad owned and operated by the largest steel company. While this strike lasted, enough steel was lost to make 18,000 automobiles, or over 1,000 freight cars, or at least 12,000 tons of oil-country tubular goods and line pipe every day. If only 5 per cent of more than 20,000,000 tons of ingots lost in 1945 and 1946 had been delivered to the oil and gas industry in the form of pipe, the shortage of pipe would not be as serious as it is today.

While demagogues are condemning the steel industry, they seldom make serious efforts to stop these strikes, and never refer to them as a major cause of inadequate steel supply.

The greatest tonnage of ingots produced in this country in any one year was 89,641,600 net tons in 1944. Present indications are that approximately 86,000,000 net tons will be produced in 1947. The greatest tonnage of oil-country tubular goods produced in 1 year was 1,418,579 net tons in 1937, and when I say oil-country tubular goods I mean casing, tubing, and drill pipe, and do not include any other form of pipe or tubular goods. It should be remembered also, that a large amount of pipe was available from stock that year. All of the mills had well-balanced stocks of pipe; there were substantial inventories in the yards of the supply companies; and I am sure there were large stocks in possession of the oil companies.

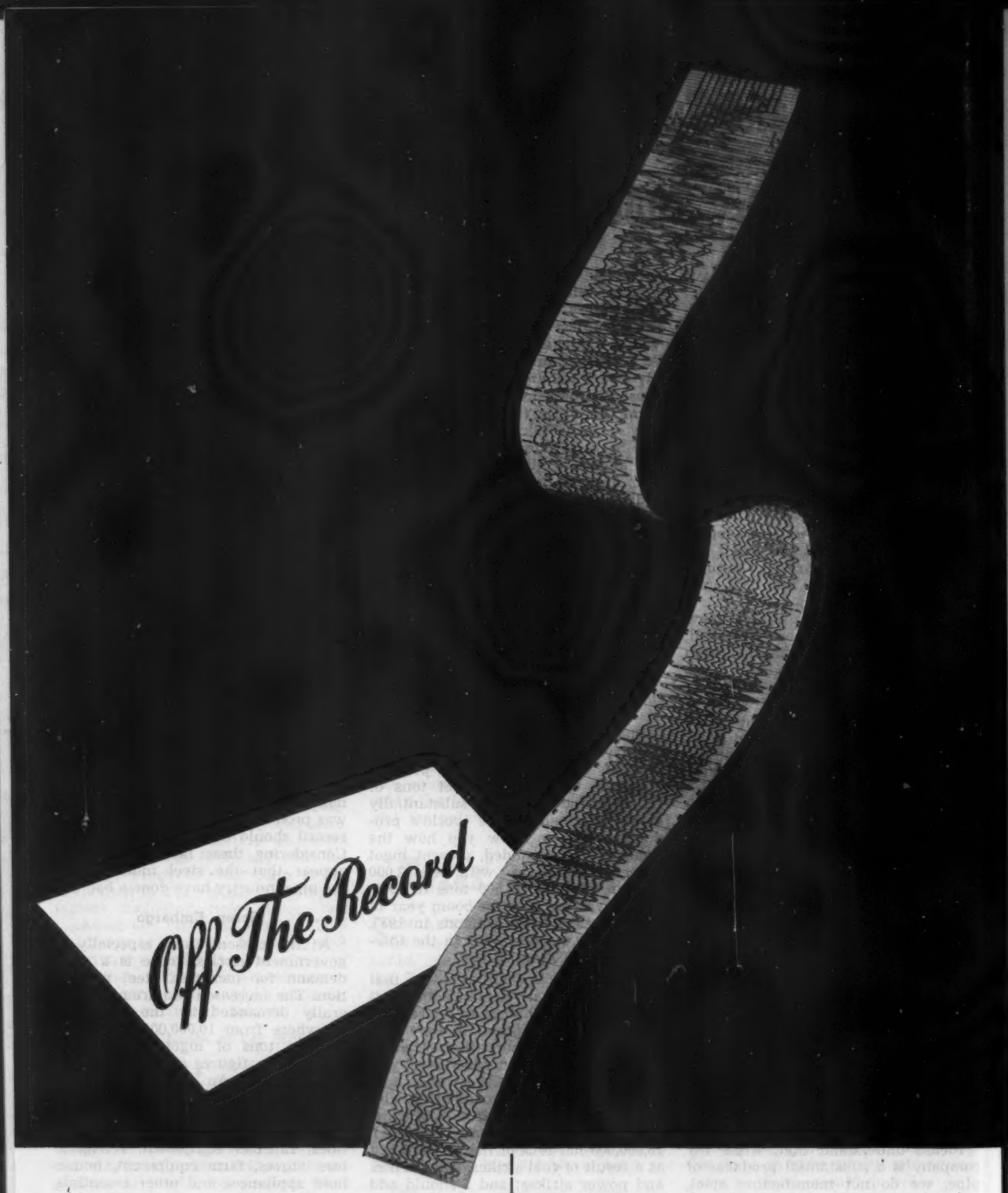
At the beginning of this year there was practically no pipe in stock at the mills, or in the hands of the supply companies, and I do not believe the inventories of the oil companies were large. The oil and gas industry drilled 33,075 wells, or a total depth of approximately 105,000,000 ft., in 1937, the year when the greatest tonnage of oil-country tubular goods was produced. As already stated, that record should be exceeded this year. Considering these facts, it does not appear that the steel industry and the pipe industry have done a bad job.

Scrap Embargo

At the present time, especially in government circles, there is a great demand for increased steel production. The increased requirement generally demanded by the critics, is anywhere from 10,000,000 to 30,000,000 net tons of ingot capacity per year. These figures are arrived at in devious ways. An economist may select any tonnage he believes will be normal requirement, and then estimate the requirements for automobiles, railroad equipment, refrigerators, stoves, farm equipment, household appliances and other essentials, to sustain his conclusions. In fact, estimates of present and future requirements usually are built up without regard to the nation's consumption of steel in past years. . . .

For many years previous to the war, millions of tons of steel and iron scrap were shipped abroad. In 1937, a committee from the small integrated steel mills called on Congress to present the facts and request an embargo on scrap. They received no consideration, and we continued to

(Continued on page 173)



Off the record *can* come misinterpretations that *may* lead to costly and unsuccessful leasing and drilling, or, perhaps, the condemnation of productive acreage.

That the Seismic staff of seismologists, now entering its fifteenth year as an organization, is capable of successfully directing an exploration campaign of any magnitude is clearly reflected in its record of operations . . . a record highlighted by *accurate interpretations*.

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ESTABLISHED 1932

PERSONALS

Refining Experience Marks Smith's Career

D J. SMITH, who was made president of Pan American Petroleum & Transport Co. following the death of E. G. McKeever last July, has been in the petroleum industry since 1916 when he joined Standard Oil Co. (Ind.) at its Whiting (Ind.) refinery, after graduating from the University of Illinois.

Since 1944 Smith has been president of Pan American Refining Corp. and several other subsidiaries and has held the positions of director and first vice president in Pan American Petroleum & Transport Co.

During the early part of his career he served in Oklahoma for several years in charge of the construction and operation of casing-head gasoline plants. He was later sent to Indiana Standard's Casper (Wyo.) refinery as superintendent of maintenance and construction.

Under his guidance as assistant general manager of manufacturing, Pan American constructed the largest refinery in the western hemisphere at Aruba, Netherlands West Indies.

In 1933 when the Pan American Refining Corp. was organized, Smith was made vice president and directed the construction of the Texas City (Tex.) refinery.

W. I. Kent, Magnolia Petroleum Co., Dallas, was recently elected chairman of the Safety Council's petroleum section for the coming year. **S. G. Wilson,** American Petroleum Institute, Washington, was elected secretary. Vice chairmen include: **D. A. Klemme,** Stanolind Oil & Gas Co., Tulsa, production; **W. O. Wilson,** Standard Oil Co. (Ind.), marketing; **D. M. Farrell,** Shell Pipe Line Corp., Houston, pipe line; **R. A. Randels,** Shell Oil Co., Inc., Wood River, Ill., manufacturing.

William Broadhurst, vice president of Helmerich & Payne, Inc., Tulsa, has been elected a trustee of Southwestern College, Winfield, Kans.

W. W. Miracle, L. R. Miracle, and **J. M. Miller** have organized Miracle Drilling Co. with offices at Olney, Ill.

J. T. Cabbage has been named a supervisor at Phillips Petroleum Co.'s Kansas City, Kans., refinery. Cabbage, who was formerly in the process engineering office, succeeded **R. R. Parker,** who has been transferred to the process engineering office in Bartlesville, Okla.

E. W. Berlin has been named head of the producing department of Standard-Vacuum Oil Co. to succeed **H. W. McCobb** who was recently elected to the board of directors. Berlin joined Nederlandsche Koloniale Petroleum Maatschappij in 1929 and worked in the Netherlands Indies until the war began. He joined Standard-Vacuum in January 1946, as assistant head of the producing department.

R. Otis McClintock, connected with the oil industry since 1909 and a former vice president of Gypsy Oil Co. (now Gulf Oil Corp.) and now president of the First National Bank & Trust Co. of Tulsa, has been named a director of Mid-Continent Petroleum Corp. He was at one time an independent operator. McClintock succeeds the late H. N. Greis.

Dr. E. Lee Treece, associate professor of bacteriology, University of Kansas, has been named to supervise study of the effects of bacteria on petroleum and natural gas. **Mitchell Korsenovsky,** an instructor, will do the laboratory work in the project for which funds amounting to $3,475 have been granted by the University of Kansas Research Foundation and the Kansas Industrial Commission for Research on Utilization of Natural Gas.

Glen M. Ruby, vice president, and **Cliff Mohr,** Curtice & Ruby, Inc., have left for Portugal where they will be engaged in geological reconnaissance work for several weeks. The work is being done by A. Johnson & Co., refinery operators and marketers of Sweden.

Donald S. Kennedy, vice president of Oklahoma Gas & Electric Co., has been promoted to executive vice president. **Walter B. Gesell,** former executive assistant, has been named vice president, and **W. R. Wolfe** has been promoted from assistant to the vice president, to vice president.

R. J. Sullivan, former assistant manager of production for Carter Oil Co., has resigned to become president of Inland Producers, Inc., Mattoon, Ill., a developing and producing company operating chiefly in the Illinois basin and active in conducting secondary-recovery and property management-operations of a consulting nature. Sullivan became division engineer at Burbank, Okla., for Carter in 1935 and was later sent to Mattoon, Ill., as division engineer. He became assistant division superintendent and later division superintendent.

G. W. Saverline, Sun Oil Co. scout, was elected president of the Oklahoma Oil Scouts and Landmen's Association at its recent meeting. **Kenneth Hickman,** scout for The Texas Co., was elected vice president, and **D. Chapman,** British American Oil Producing Co. scout, was named secretary-treasurer.

W. J. Darby, petroleum engineer for Pritchard & Abbott, Fort Worth, and formerly chief engineer and refining superintendent for Cosden Petroleum Corp. in West Texas and Oklahoma, will join Shurmon & Kirkwood, Fort Worth oil-industry tax consultants, as a member of the firm January 1.

H. C. Teasdel, former vice president and administrative assistant to the president of The California Co., has been elected president. He succeeds **K. H. Crandall,** former president of the company, who has been elected to the newly created position of vice chairman of the board.

S. M. Sisley, assistant general superintendent of the gas-gasoline department in the Tulsa area for Shell Oil Co., Inc., has been transferred to Houston as senior engineer. Other changes in the gas-gasoline department of Shell include: **M. R. Church,** manager of the Houston area, to the regional staff as assistant to the director; **Gheorge Fotescu,** senior mechanical engineer in the Midland (Texas) area, to the regional staff,

PERSONALS

Houston; **J. L. Brown,** Pacific Coast territory to regional staff at Houston; and **W. B. Golush,** Pacific Coast territory to regional staff, Houston. In the treasury department **W. F. Colbaugh,** acting section head in Houston area to section head (Jt. Venture), Houston; and **J. W. Benn,** in the Midland area to the Houston regional staff.

Eugene R. Mingle, junior engineer with Cities Service Oil Co., has been transferred from Oakley, Kans., to Pampa, Tex.

C. E. Murphy, engineer for United Gas Corp. in the Houston general office, has been promoted to senior engineer and transferred to the Mississippi division office at Jackson. **Billy E. Harrell,** graduate engineer from Alabama Polytechnic Institute, has joined the United's engineering staff at Shreveport as a junior engineer. **L. L. Kessee,** supervisor of maintenance and construction, has been transferred from El Dorado to Magnolia, Ark., as foreman of the Magnolia district.

E. G. Cole has been named chief geologist of the Texas division of Sinclair Prairie Oil Co. at Fort Worth.

J. T. Paddleford, former Stanolind Oil & Gas Co. geologist, Wichita, and a former consultant at Wichita and at Casper, Wyo., is now chief geologist and petroleum engineer for R. Olsen Oil Co., Oklahoma City.

Joe Lilly has resigned from the geological department of Stanolind Oil & Gas Co. at Albuquerque to join Byrd-Frost Oil Co.

William H. Roberts, III, geologist, Union Oil Co. of California, has been transferred from Laramie, Wyo., to Cut Bank, Mont.

Paul Netterstrom, formerly with Ohio Oil Co., has joined Barnsdall Oil Co. at Casper, Wyo.

Dr. Irving A. Denison, long-time member of the soil-corrosion section of the National Bureau of Standards, has been appointed chief of the underground-corrosion section. As head of this section Dr. Denison will direct fundamental studies of underground corrosion on pipe materials and protective coatings in representative soils.

John W. Tynan, Phillips Petroleum Co., has been transferred from Burbank field, Oklahoma, to the main office in Bartlesville as senior reservoir engineer.

W. C. Imbt, district geologist for Stanolind Oil & Gas Co. in West Texas at Midland, has been promoted to exploration manager for the company at Houston. He takes the place of **Foster J. Schempf,** who has been appointed to the production department of Stanolind in charge of the East Texas production office at Longview. Imbt will have charge of all geological, geophysical, and land work for Stanolind in the Houston division. **Ed L. Reed,** Stanolind's district geologist at Wichita Falls, Tex., has succeeded Imbt. **S. P. Ellison, Jr.,** a member of the West Texas-New Mexico district geological department for Stanolind, has been appointed to succeed Reed at Wichita Falls.

E. F. UNDERWOOD

E. F. Underwood, wholesale sales manager of Skelly Oil Co. at Kansas City, Mo., since 1934, has resigned to become executive vice president of Graco Oil & Refining Co. with headquarters at Denver. Announcement of the appointment of Underwood was made by **E. A. Markey,** Graco president, who formerly was in charge of the Denver refinery of Continental Oil Co. Underwood had been with the Skelly organization since 1926 and served in all branches of the sales organization and in various division posts prior to the time he was named head of wholesale sales for the entire Skelly organization.

Dave Evans, tool pusher for Lowell Drilling Co., has been transferred from Great Bend, Kans., to Pueblo, Colo.

S. L. Vencil, geophysicist for Shell Oil Co., Inc., at Lamar, Colo., Tulsa, area, has been promoted to seismologist, Houston area. Other recent changes include: **G. P. Atkinson** and **T. W. Barron,** junior mechanical engineers, gas-gasoline, New Orleans area, to regional staff, Houston; **J. D. Boswell,** junior mechanical engineer, production, Quitman to Eagle Lake, Tex.; **R. L. Elkins,** junior mechanical engineer, production, Houston to Kilgore, Tex.; **R. Porter,** junior mechanical engineer, gas-gasoline, Orlando, Okla., to Houston; **J. R. Gollnick,** junior exploitation engineer, production, Houston to Midland, Tex.; **J. E. Lewis, Jr.,** junior mechanical engineer, production, Houston to Kilgore; **J. R. Patterson,** junior exploitation engineer, production, Tulsa to Houston area; **K. A. Ring,** junior exploitation engineer, production, Houston to Midland; **F. R. Fraser,** junior exploitation engineer, production, Tulsa to Houston area; **R. Bard,** technical assistant, transportation and supplies, administrative, head office, New York, to assistant to regional director, gas-gasoline, regional staff, Houston; and **E. L. Kennedy,** senior draftsman, production, Houston area to regional staff, Houston.

The Operators Engineering Committee in Rangely (Colorado) field is one of the most recently organized groups of its kind in the industry. Its work embraces a large and active oil-producing area. Members of the committee at a recent meeting: (Seated) T. O. Mayo, secretary, Wasatch Oil Refining Co.; F. H. Kratha, Jr., petroleum engineer, Union Pacific Oil Development Co.; H. L. Howard, Jr., petroleum engineer, Stanolind Oil & Gas Co.; F. S. Zagar, petroleum engineer, The Texas Co.; E. F. Casey, Equity Oil Co.; H. S. Quick, Stewart McLaughlin interests; W. C. Savage, production scout, The California Co. (Standing) C. W. Griffin, superintendent, Wasatch Oil Refining Co. and Idaho Oil Refining Co.; John E. Lang, field engineer, Stanolind Oil & Gas Co.; E. W. Olson, petroleum engineer, The Texas Co.; W. T. Hudson, field geologist, The California Co.; and George de Mohrenschildt, Rangely Operators Engineering Committee. Absent were Joe Zoricheck, advisory engineer, Rangely Operators Engineering Committee; Buck Davidson, field superintendent, Sharples Oil Corp., and H. Riecken, petroleum engineer, Phillips Petroleum Co.

C. E. Deaton, consulting geologist, has established headquarters at Centralia, Ill.

Willard Lape, safety director of Arkansas Natural companies, was elected chairman of the Ark-La-Tex chapter of the American Society of Safety Engineers at the annual meeting held recently in Shreveport.

James W. Hammond, formerly chief industrial hygienist and assistant director for the division of industrial hygiene of the Georgia State Department of Public Health, has joined Humble Oil & Refining Co. as industrial hygiene engineer.

T. S. Johnson, former manager of Imperial Oil, Ltd.'s marine department, has been appointed assistant to the vice president in charge of supply and transportation. He was formerly with Lago Oil & Transport Co. and later with Standard-Vacuum Oil Co. as assistant manager of their marine operations. **W. O. Twaits,** former assistant manager of the supply and economics department of Imperial, has been named manager of the newly formed coordination and economics department.

Clark R. Steinberger, former West Texas-New Mexico district geologist for Skelly Oil Co. at Midland, Tex., has resigned effective November 1, to become manager of a new office to be opened in Midland by United States Smelting, Refining & Mining Co. It will be headquarters for the company's oil activities, including operations in the Permian Basin and the Rocky Mountain areas.

Carl Myers, former controller, Tennessee Gas Transmission Co., Houston, has been elected treasurer of the company. Other recent elections by the board include **W. D. Walser,** former assistant secretary, to secretary. **R. L. McVey** has been appointed controller to succeed Myers; **N. W. Freeman** has been appointed assistant to the president; and **Curtis Smith** has been appointed manager of the personnel department.

C. L. Ware, scout for Phillips Petroleum Co., has been transferred from Wichita Falls, Tex., to Durango, Colo.

Ray Morris has been transferred from Stanolind Oil & Gas Co. scouting department to the geological department at Amarillo, Tex. **N. S. Morrisey,** formerly in the production department at Rangely field, Colorado, will succeed him.

E. R. Douglas, graduate of Texas Christian University, has joined the geological department of Atlantic Refining Co. at Midland, Tex. **George R. Wesley,** district geologist for Atlantic at Evansville, Ind., has been transferred to Tulsa.

W. H. Conkling, district geologist for Sun Oil Co. in the Permian basin, has been elected president of the Midland (Tex.) Geological Society. **Clark R. Steinberger,** district geologist for Skelly Oil Co., was named vice president; **A. E. Pettit,** district superintendent for the Cooperative Refinery Association, secretary-treasurer, and **E. Russell Lloyd,** consulting geologist, program chairman. **W. Dave Henderson,** of Henderson & McMillan, was the outgoing president.

Irwin Frankel and **William R. Hencke,** chemical engineers, have joined the Beacon Laboratories of The Texas Co. at Beacon, N. Y. Frankel is a graduate of Tulane University and Hencke from Virginia Polytechnic Institute.

SHIFTS—

E. F. Goodner, superintendent, Standard Oil Co. of California, San Francisco to Portland, Ore.; **Leon H. Jennings,** engineer, Magnolia Petroleum Co., Silsbee to Beaumont, Tex.; **H. L. Hall,** superintendent, Monday Oil Co., Beeville to Victoria, Tex.; **J. S. Welboan, Jr.,** engineer, The Texas Co., Crane to Kermit, Tex.; **W. C. Guess,** foreman, Sun Oil Co., Galveston, Tex., to Cameron, La.; **Thomas C. Frick,** superintendent, Atlantic Refining Co., Greggton to Odessa, Tex.

John T. Ashford, engineer, Associated Engineers, Inc., Houston to Midland, Tex.; **Ivan H. Spoor, Jr.,** engineer, Universal Oil Products Co., Cicero to Chicago; **J. W. Cole, Jr.,** engineer, Gulf Oil Corp., Kilgore to Houston; **Clarence Roberts,** foreman, Stanolind Oil Purchasing Co., Mexia to Beaumont, Tex.; **Kenneth G. Burgess,** chemist, American Liberty Oil Co., Mount Pleasant, Tex., to New Orleans; **George W. Isensee,** foreman, Magnolia Petroleum Co., Seminole to Odessa, Tex.

C. H. Thurber, engineer, Plymouth Oil Co., Sinton to Laredo, Tex.; **F. W. Briggs,** foreman, Continental Oil Co., Homer to Plain Dealing, La.; **D. C. Chambers,** superintendent, N. H. Wheless Drilling Co., St. Martinville to Lafayette, La.; **M. G. Teghtmeyer,** engineer, Cities Service Refining Corp., Maplewood, La., to Tulsa.; **Ray Parker,** chemist, Wood River Oil & Refining Co., Boulder, Colo., to Hartford, Ill.; **George P. Zebal,** geologist, The California Co., Denver, to Lexington, Ky.

Joseph J. Sanna, engineer, The California Co., Rangely to Hamilton, Colo.; **E. P. Heath,** superintendent, Sunray Oil Corp., Bushton to Hutchinson, Kans.; **W. O. Meek,** foreman, Sunray Oil Corp., Stafford to Palinsville, Kans.; **E. A. Meyer,** engineer, Phillips Petroleum Co., Kaw City, Okla., to Salina, Kans.; **Evan Watts,** foreman, Magnolia Petroleum Co., Blanco to Aztec, N. M.; **C. N. Goodell,** foreman, Sinclair Prairie Oil Co., Henderson, Ky., to Carmi, Ill.; **R. W. Ankrom,** superintendent, Pure Oil Co., Reed City, Mich., to Dawes, W. Va.; **Harry H. Emmerich,** geologist, Magnolia Petroleum Co., West Jackson, Miss., to Wichita, Kans.

DEATHS

Samuel Butler, Sr., 63, Denver oil operator and former head of Arab Gasoline Corp. and now president of Sharples Corp., and **Frank Dwyer,** about 60, an associate who aided Butler in developing oil properties in Lost Soldier field in Wyoming, were found dead October 15 near Eastland, Tex.

Robert S. Newton, 48, general manager of the Sterling Oil division of Quaker State Oil Corp., Emlenton, Pa., was killed in an automobile accident October 15 near Butler, Pa.

Linn H. Barr, 72, retired boiler house foreman of The Texas Co.'s West Tulsa refinery, died October 13 in Rochester, Minn.

Charles Carl, veteran production superintendent of Deep Rock Oil Corp. in the Drumright, Cushing and Meehan districts, died October 16 in Dallas.

Walter L. Rinaman, 63, superintendent of the Oklahoma Natural Gas Co.'s land and geological departments, died October 14 in Muskogee, Okla. Rinaman was at one time secretary of Gem Oil Co. and later was with The Texas Co. and Gulf Oil Co.

A. Mills Ebright, 66, general counsel for Cities Service Oil Co. and Empire Pipe Line Co., Bartlesville, Okla., died October 16 in Bartlesville.

George W. Howard, 76, veteran oil operator in southern California and Texas, died October 15 in Corpus Christi, Tex.

Carl D. Smith, 69, pioneer consulting geologist and Oklahoma oil operator, died October 10 in Stephens, Ark.

(Left) At extreme left appears a fluid catalytic cracking unit of the down-flow type (Standard Oil Co. of New Jersey Bayway refinery, Linden, N. J.). The other big fluid cat cracker shown is a unit of the up-flow type (same owner, same refinery)

(Below) Charles Baltz, job coordinator for the regional engineers who supervised the overhaul of the fluid catalytic cracking unit, using a public-address system to direct activities of the 300 workmen engaged in inspecting and repairing the unit. A record time of 13 days was established for the overhaul

by Arch L. Foster

CAREFUL, DETAILED PLANNING IS KEY TO EFFICIENT

Maintenance OF FLUID Cat Cracker

MAINTENANCE of catalytic cracking, or even of thermal cracking units, is planned mainly for action at shutdown periods. At these times it is necessary to carry out practically all maintenance operations, since obviously much of the work cannot be done while the unit is in operation. Since the first catalytic units were built and operated during the early 1940's, the methods, routines, and main principles governing efficient maintenance have undergone extensive development until in most cases carefully planned, efficient systems have been arranged by the various companies operating the plants.

Necessarily the system developed by each company will vary somewhat in details, sometimes in principles employed, but in general they will follow a common routine, dictated by good engineering practices to fit the specific process employed. Different processes involve different details and specific procedures, but all are involved in the same goal. This is to make the "turnaround" as short as possible, and the repairs and inspections as complete as possible to insure the longest periods on stream.

This article, while attempting to typify the manner and major details of a turnaround of a fluid catalytic cracking unit in general, in the interest of details and specific facts is built around a recent extremely rapid turnaround of an upflow fluid catalytic unit, during June and early July 1947, in the Bayway, (Linden) N. J., refinery of Standard Oil Co. of New Jersey. This individual turnaround is one of the fastest that has

(Upper left) Insulating the exterior of new 36-in. steel tubing on the fluid catalytic cracking unit. (Upper right) Here the insulator is sealing blocks of insulation material attached to the exterior of new 36-in. steel duct. The insulation is covered with a hard surfacing cement to protect it from the weather. The cat cracker's pipes vary in size from a 6-ft. flue gas line to ¼-in. copper tubing of the instrument lines. It is in the larger lines that wear develops. An inspector, equipped with a flashlight, pencil, and notebook, crawled through every line large enough to admit him, i.e., every line of 20-in. diameter and above.

(Right) A burner cuts diamond plate for the installation of platforms on the unit

Pipe fitter installing a top slide valve on the 28-in. spent-catalyst standpipe

ever been carried out by this organization in its relatively long experience with three upflow fluid units and five downflow units operated by the company and its subsidiaries.

Results of this turnaround and the time saved by the methods employed show how careful study of the needs of the job can improve operations and the economics of the process. Formerly the normal period for inspection, repair, and replacement on such a unit was 3 to 4 weeks. As experience grew, it became possible to anticipate from previous knowledge and the experiences of any individual period on stream the main items of repair which might be expected at the end of a run. The turnaround under discussion was completed in 14 days, and the results may be translated into increased outputs of petroleum products.

Time saved over previous records represents at least 3,000,000 gal. of gasoline and 2,500,000 gal. of heating oil, added to the refinery's annual output to meet the demand which still sees shortages in various parts of the country. This job required 400 men and supervisors to complete, their work and the sequence of their operations being managed, supervised and oriented as perfectly as was possible with the careful previous planning and coordination during the operation.

(Continued on page 114)

A Critical Review of Methods Used in the Estimation of

NATURAL-GAS RESERVES

by Henry J. Gruy* and Jack Crichton*

TERMS currently used by the American Gas Association to describe the various types of gas in accordance with the nature of its existence in the reservoir are:

1. Nonassociated gas—free gas not in contact with crude oil in the reservoir.

2. Associated gas—free gas in contact with crude oil in the reservoir.

3. Dissolved gas—gas in solution in crude oil in the reservoir.

Estimating Nonassociated Gas Reserves

Volumetric method.—This method, as currently used, makes use of structural and isopachous maps based on data from electrical logs, cores, and drill-stem and production tests. Sand volumes are obtained by planimetering. Core-analysis data and electrical-log interpretation permit reasonable estimates of porosity, connate water, and net productive thickness so that the volume of gas filled pore space may be calculated. Laboratory analysis of the gas for determination of its compressibility at various pressures and temperatures, and the determination of reservoir pressure and temperature by recording instruments make it possible to calculate the volume of gas contained in the reservoir with reasonable accuracy.

Calculation of the gas in place in the reservoir may be accomplished by use of the following formula:

$$Q = 43{,}560 \times \phi \times (1 - S_w) \times \frac{P}{P_b} \times \frac{460 + t_b}{460 + t} \times \frac{1}{Z}$$

where
- Q = cu. ft. of gas per ac.-ft. at base temperature and pressure
- 43,560 = number of cu. ft. per ac.-ft.
- ϕ = porosity expressed as a decimal fraction
- S_w = interstitial water expressed as a decimal fraction
- P = reservoir pressure in psia.
- P_b = base pressure in psia.
- t = reservoir temperature in °F.
- t_b = base temperature in °F.
- Z = compressibility factor at pressure P

Reserves may also be calculated volumetrically by use of the pound mol as a base for computation. The following formula is used:

$$V = \frac{ZNRT}{P}$$

where
- V = volume in cu. ft.
- Z = compressibility factor at pressure P
- N = number of pound mols
- R = 10.71
- T = absolute temperature
- P = pressure in psia.

The volume occupied by 1 lb. mol of any gas at standard conditions is 379.4 cu. ft. Therefore, the volumetric formula may be expressed as follows:

$$Q = 43{,}560 \times \phi \times (1 - S_w) \times \frac{379.4}{V}$$

where
- V = cu. ft. of gas per pound mol at reservoir conditions

In the event a water drive is not anticipated the volume of gas which will remain in the reservoir at the expected abandonment pressure may be calculated, and deducted from the volume of gas initially in place to determine the volume of recoverable gas.

In the case of water-drive fields, the pressure will be wholly or partially maintained by the movement of water into the reservoir as gas is withdrawn, the magnitude of pressure decline being dependent on the rate of gas withdrawal with respect to the rate of water advancement.

Porosity is the most important factor in the volumetric formula and a small error in porosity will result in a large error in the estimated reserve. For instance, if the porosity is actually 20 per cent and is estimated to be 15 per cent the result is a reserve estimate which is 24 per cent low. Fig. 2 shows the relationship of the original volume of gas in place to the depth of the reservoir for various net porosities.

The compressibility factor can be accurately determined by laboratory measurement. If laboratory measurements are not available reasonable estimates can be made by the use of

*DeGolyer & MacNaughton, Dallas. Excerpts from the presentation at the Tulsa meeting of the Petroleum Division, A.I.M.E., October 8-10.

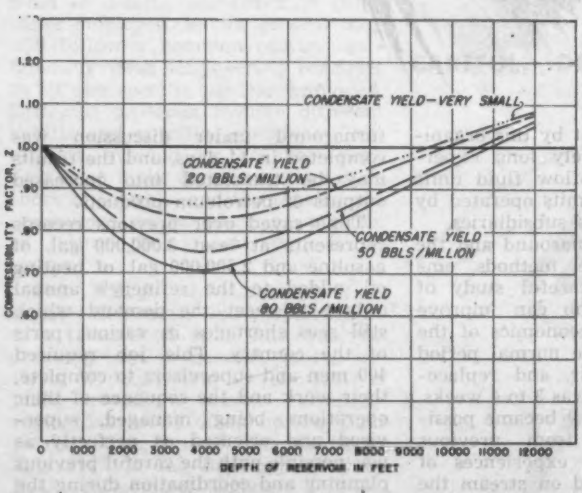


Fig. 1—Curves showing change in the compressibility factor with depth and composition of the wet gas

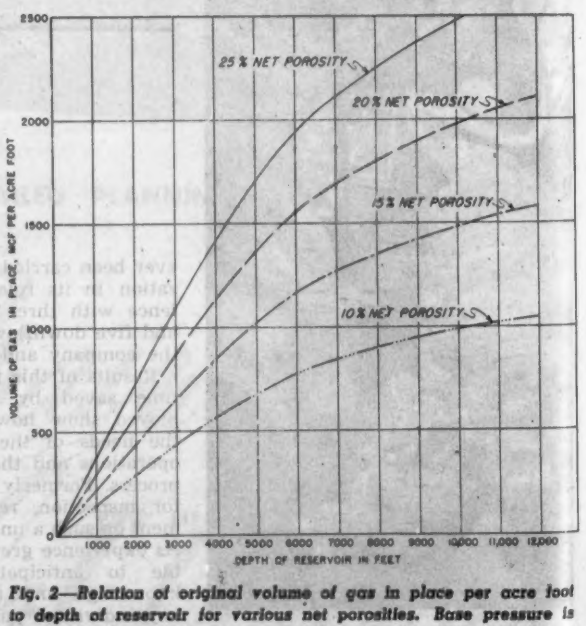


Fig. 2—Relation of original volume of gas in place per acre foot to depth of reservoir for various net porosities. Base pressure is 14.65 psi.; wet-gas gravity is .678; separator yield—20 bbl. per million cubic feet of gas

published data. This factor is sometimes ignored by estimators; however, an error of as much as 30 per cent may result from its omission. This factor is especially large for gases rich in condensate and occurring at depths of 3,500 to 4,500 ft., in which case its omission results in under estimation of the reserve. (See Fig. 1.) Omission of this factor results is over estimation of the reserve in abnormally high pressured reservoirs frequently encountered below 10,000 ft. in some areas of the Gulf Coast.

Decline-Curve Methods

The pressure-decline curve is one of the most widely used, and one of the most reliable of the several means of estimating gas reserves in those reservoirs which do not have a water drive. Several types of pressure-decline curves are used.

In the event a water drive is not present well-head or reservoir pressure plotted against cumulative production may be extrapolated in a straight line to the expected abandonment pressure, and the ultimate recovery read direct. Estimates made in this manner ignore the effect of deviation from Boyle's law.

When the accuracy of other data justify refinements, reservoir pressure divided by the compressibility factor (Z) may be plotted against cumulative production to correct for the effect of deviation from Boyle's law. (See Fig. 3.)

The equal pound loss method is a special use of this method in which a curve is not actually constructed, but the production at the point of intersection of the curve with the abandonment pressure is calculated by assuming a constant slope determined by the initial pressure and the pressure after a known volume of gas has been withdrawn. This method is not as reliable as a decline curve since only two pressure points are used.

The equal pound loss method may be corrected for deviation of gas from Boyle's law by use of the following formula, published by Dr. E. A. Stephenson in the "Geology of Natural Gas" in 1935:

$$R = Q \frac{(P_r\, d_r - P_a\, d_a)}{(P_i\, d_i - P_r\, d_r)}$$

where
- R = gas reserve to abandonment pressure
- Q = production of the reservoir during the decline in pressure from P_i to P_r
- P_i = initial pressure of the reservoir
- P_r = reservoir pressure as of the date of appraisal
- P_a = reservoir pressure as of the date of abandonment
- d_i = deviation factor at P_i
- d_r = deviation factor at P_r
- d_a = deviation factor at P_a

Cumulative production per pound decline in closed-in well-head or reservoir pressure may be plotted against cumulative production or against time. If values for cumulative production per pound pressure decline are constant, the resulting curve is a straight line parallel to the time or cumulative production axis, and it may be assumed that estimates of reserves made by use of the equal pound loss method or by extrapolation of the pressure cumulative production decline curve will be correct. If the slope of the curve is negative (i.e. values of cumulative production per pound drop increase with cumulative production or time) water, oil or gas is encroaching into the known gas area. It should be remembered that the effect of deviation from Boyle's law will cause a slight increase in values even if a water drive is not present.

A large error is often introduced by the method of obtaining the average field pressure. . . . Errors of this type can be reduced by constructing isobaric maps and planimetering to obtain the weighted average pressure. The reservoir area used in obtaining the weighted average pressure should be the same for each point plotted. If a reservoir is determined to be larger than previously estimated, all isobaric maps should be corrected and pressures recalculated so that all points on the curve represent the average pressure of the same area. Greater accuracy can be obtained by weighting pressures on the basis of reservoir pore volume rather than on the basis of surface acreage, if there are large variations in net productive thickness.

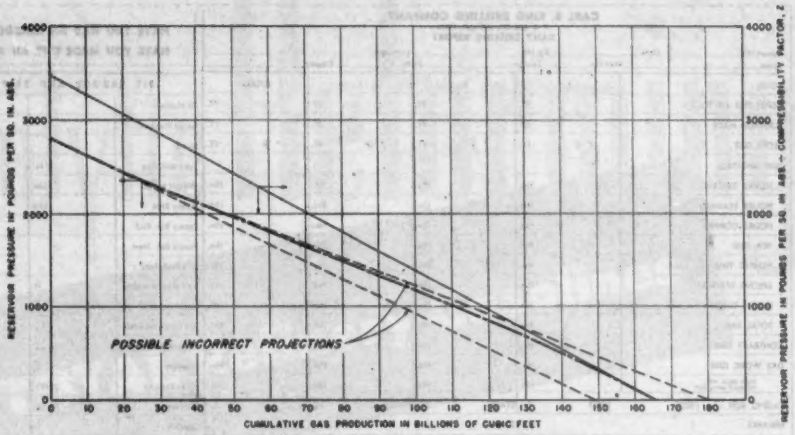

RESERVOIR PRESSURE IN POUNDS PER SQ. IN. ABS.
RESERVOIR PRESSURE IN POUNDS PER SQ. IN. ABS. ÷ COMPRESSIBILITY FACTOR, Z
POSSIBLE INCORRECT PROJECTIONS
CUMULATIVE GAS PRODUCTION IN BILLIONS OF CUBIC FEET

Fig. 3—Comparison of theoretical reservoir pressure-cumulative production curve with theoretical reservoir pressure divided by Z—cumulative production curve

Estimating Associated Gas Reserves

The problem of estimation is simplified if no effort is made to distinguish between associated and dissolved gas. The total original gas reserve may be computed and the cumulative production of associated and dissolved gas subtracted to obtain the

(Continued on page 116)

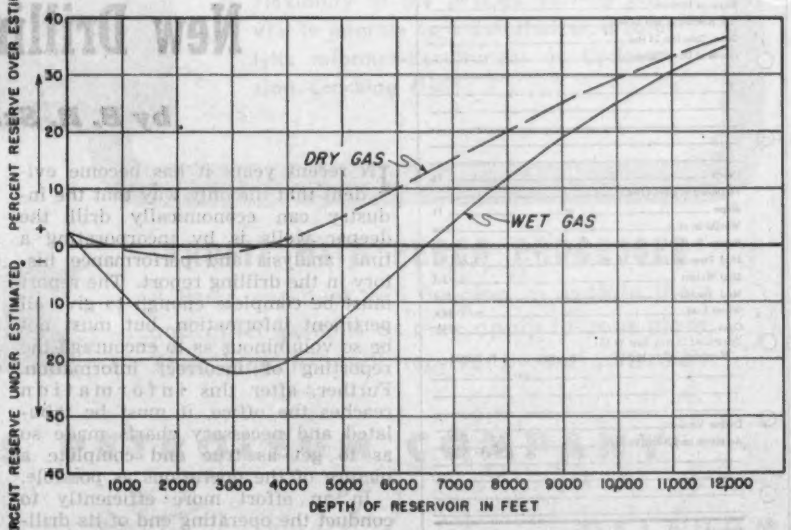
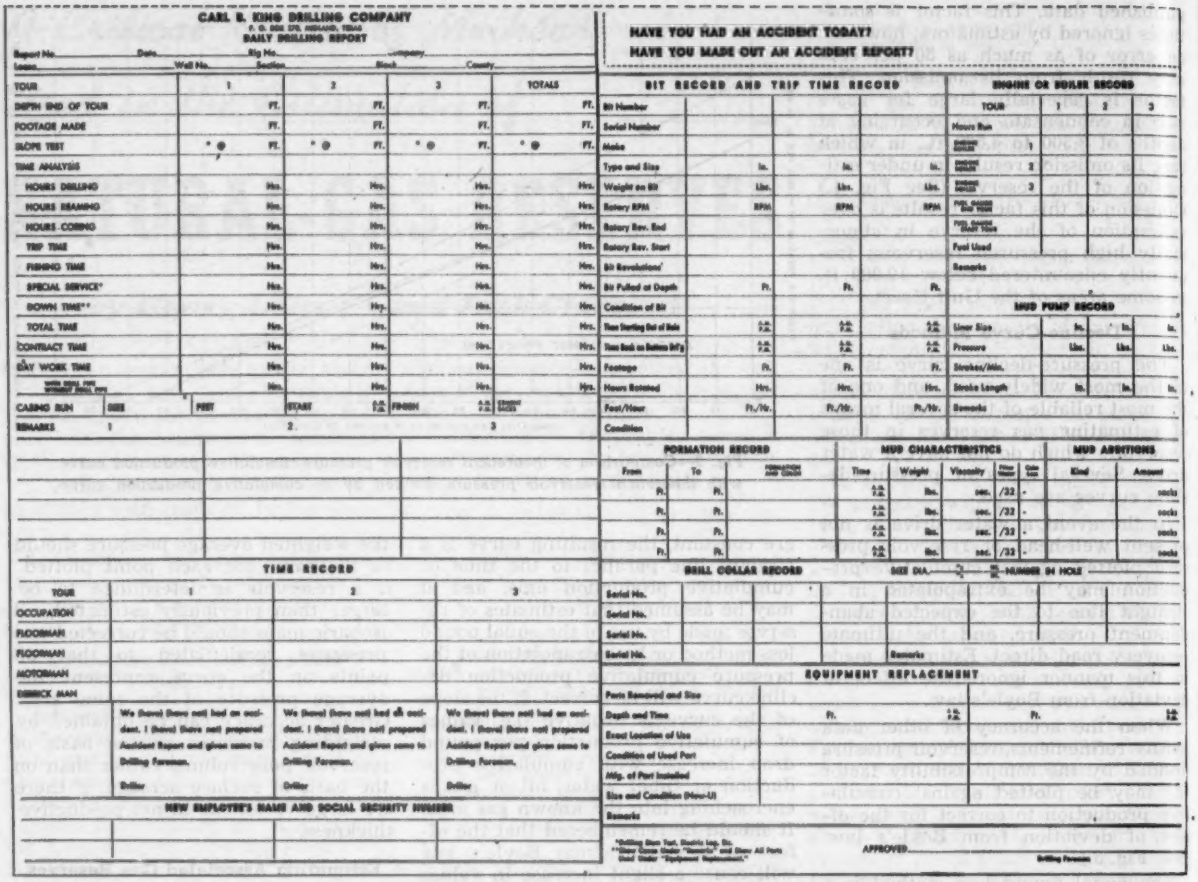


Fig. 4—Per cent error resulting from omission of both temperature and compressibility factor



CARL B. KING DRILLING COMPANY
P. O. BOX 370, MIDLAND, TEXAS
DAILY DRILLING REPORT

Report No. _____ Date _____ Rig No. _____ Company _____
Lease _____ Well No. _____ Section _____ Block _____ County _____

TOUR	1	2	3	TOTALS
DEPTH END OF TOUR	FT.	FT.	FT.	FT.
FOOTAGE MADE	FT.	FT.	FT.	FT.
SLOPE TEST	° @ FT.	° @ FT.	° @ FT.	° @ FT.
TIME ANALYSIS				
HOURS DRILLING	Hrs.	Hrs.	Hrs.	Hrs.
HOURS REAMING	Hrs.	Hrs.	Hrs.	Hrs.
HOURS CORING	Hrs.	Hrs.	Hrs.	Hrs.
TRIP TIME	Hrs.	Hrs.	Hrs.	Hrs.
FISHING TIME	Hrs.	Hrs.	Hrs.	Hrs.
SPECIAL SERVICE*	Hrs.	Hrs.	Hrs.	Hrs.
DOWN TIME**	Hrs.	Hrs.	Hrs.	Hrs.
TOTAL TIME	Hrs.	Hrs.	Hrs.	Hrs.
CONTRACT TIME	Hrs.	Hrs.	Hrs.	Hrs.
DAY WORK TIME	Hrs.	Hrs.	Hrs.	Hrs.
WORK DONE, PIPE WITHOUT MAKING HOLE, ETC.	Hrs.	Hrs.	Hrs.	Hrs.

CASING RUN | SIZE | FEET | START A.M. P.M. | FINISH A.M. P.M. | STRAIGHT HOLE?
REMARKS 1 2 3

HAVE YOU HAD AN ACCIDENT TODAY?
HAVE YOU MADE OUT AN ACCIDENT REPORT?

BIT RECORD AND TRIP TIME RECORD

Bit Number			
Serial Number			
Make			
Type and Size	In.	In.	In.
Weight on Bit	Lbs.	Lbs.	Lbs.
Rotary RPM	RPM	RPM	RPM
Rotary Rev. End			
Rotary Rev. Start			
Bit Revolutions'			
Bit Pulled at Depth	Ft.	Ft.	Ft.
Condition of Bit			
Time Starting Out of Hole	A.M. P.M.	A.M. P.M.	A.M. P.M.
Time Back on Bottom Mfg	A.M. P.M.	A.M. P.M.	A.M. P.M.
Footage	Ft.	Ft.	Ft.
Hours Rotated	Hrs.	Hrs.	Hrs.
Feet/Hour	Ft./Hr.	Ft./Hr.	Ft./Hr.
Condition			

ENGINE OR BOILER RECORD

TOUR	1	2	3
Hours Run			
ENGINE OR BOILER 1			
ENGINE OR BOILER 2			
ENGINE OR BOILER 3			
FUEL GAUGE END TOUR			
FUEL GAUGE START TOUR			
Fuel Used			
Remarks			

MUD PUMP RECORD

Liner Size	In.	In.	In.
Pressure	Lbs.	Lbs.	Lbs.
Strokes/Min.			
Stroke Length	In.	In.	In.
Remarks			

FORMATION RECORD

From	To	FORMATION AND COLOR
Ft.	Ft.	
Ft.	Ft.	
Ft.	Ft.	
Ft.	Ft.	

MUD CHARACTERISTICS

Time	Weight	Viscosity	Water Loss	Cake Thick.
A.M. P.M.	lbs.	sec. /32	-	
A.M. P.M.	lbs.	sec. /32	-	
A.M. P.M.	lbs.	sec. /32	-	
A.M. P.M.	lbs.	sec. /32	-	

MUD ADDITIONS

Kind	Amount
	sacks
	sacks
	sacks
	sacks

TIME RECORD

TOUR	1	2	3
OCCUPATION			
FLOORMAN			
FLOORMAN			
MOTORMAN			
DERRICK MAN			

We (have) (have not) had an accident. I (have) (have not) prepared Accident Report and given same to Drilling Foreman.
Driller

We (have) (have not) had an accident. I (have) (have not) prepared Accident Report and given same to Drilling Foreman.
Driller

We (have) (have not) had an accident. I (have) (have not) prepared Accident Report and given same to Drilling Foreman.
Driller

NEW EMPLOYEE'S NAME AND SOCIAL SECURITY NUMBER

DRILL COLLAR RECORD — SIZE DIA. — NUMBER IN HOLE

Serial No.							
Serial No.							
Serial No.							
Serial No.				Remarks			

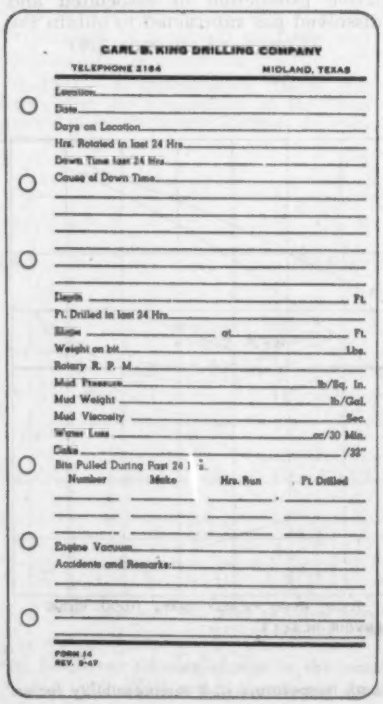
EQUIPMENT REPLACEMENT

Parts Removed and Size		
Depth and Time	Ft. A.M. P.M.	Ft. A.M. P.M.
Exact Location of Use		
Condition of Used Part		
Mfg. of Part Installed		
Size and Condition (New-U)		
Remarks		

*Drilling Stem Test, Electric Log, Etc.
**Time Curves Under "Remarks" and Show All Parts Used Under "Equipment Replacement."

APPROVED _____ Drilling Foreman

Fig. 1—(Above) Note the emphasis on "time" in this new daily drilling report form. Feeling that drilling costs are closely related to time, this contractor is using a drilling report which will give sufficient information for a time analysis and performance history on each well. Fig. 2—(Below) Each tool pusher carries this form in a pocket-size loose-leaf notebook and fills it in each morning prior to phoning the information to the home office



CARL B. KING DRILLING COMPANY
TELEPHONE 2184 MIDLAND, TEXAS

Location _____
Date _____
Days on Location _____
Hrs. Rotated in last 24 Hrs. _____
Down Time last 24 Hrs. _____
Cause of Down Time _____

Depth _____ Ft.
Ft. Drilled in last 24 Hrs. _____
Slope _____ at _____ Ft.
Weight on bit _____ Lbs.
Rotary R. P. M. _____
Mud Pressure _____ lb./Sq. In.
Mud Weight _____ lb./Gal.
Mud Viscosity _____ Sec.
Water Loss _____ cc/30 Min.
Cake _____ /32"
Bits Pulled During Past 24 Hrs.

Number	Make	Hrs. Run	Ft. Drilled

Engine Vacuum _____
Accidents and Remarks: _____

FORM 14
REV. 9-47

West Texas Contractor Devises New Drilling Records

*by B. R. Schabarum**

IN recent years it has become evident that the only way that the industry can economically drill the deeper wells is by incorporating a time analysis and performance history in the drilling report. The report must be complete enough to give all pertinent information, but must not be so voluminous as to encourage the reporting of incorrect information. Further, after this information reaches the office, it must be tabulated and necessary charts made so as to get as true and complete a picture of the operations as possible.

In an effort more efficiently to conduct the operating end of its drilling business in the Permian basin of West Texas, Carl B. King Drilling Co. has developed new forms and charts.

Fig. 1 shows a page from the daily drilling report book. It will be noted that the time distribution is emphasized. The time used each day is broken down as it is felt that in the drilling business costs are closely related to time. Any improvements in the cost picture will generally show a reduction in the operating time.

It will be noted that the time record is also tied up with the accident record so as to remind the driller of the necessity of preparing an accident report prior to his leaving the rig at the conclusion of his tour.

The bit record section is self-explanatory except for possibly the "Ro-

*Carl B. King Drilling Co., Midland, Tex.

Perco Catalytic Reforming

Upgrades TOTAL Refinery Gasolines

Upgrading low octane gasolines and naphthas is economically performed by PERCO CATALYTIC REFORMING. Whatever the types of stocks to be treated and whatever the size of your refinery, this process can increase octane value and lead response of your total gasoline so that higher specifications can be met.

CHECK THESE DISTINCT ADVANTAGES:

1. Perco Reforming Units are simple in design
2. Installation and operating costs are comparatively low
3. Conversion to gas is low . . . yields are high
4. Treats straight-run and cracked gasolines, naphthas and blends
5. Overall refinery gasoline improvement is obtained, together with desulfurization and an increased spread between ASTM and Research octanes
6. Flexibility of the process permits each unit to operate as a desulfurizer, a catalytic reformer-desulfurizer or Cycloversion Cracking Unit

Phillips 66

PERCO PROCESSES

PROFIT WITH PERCO PROCESSES

A Perco engineer will be glad to explain these and other benefits as they apply to your plant. Your inquiries will receive prompt attention.

PHILLIPS PETROLEUM COMPANY

BARTLESVILLE, *Chemical Products Department* OKLAHOMA

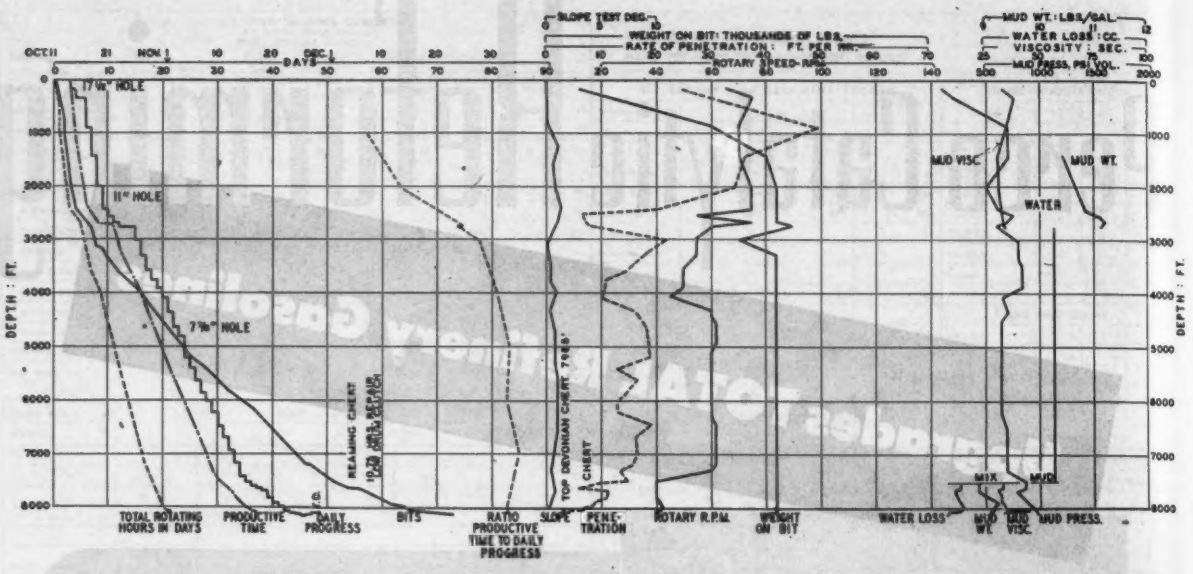


Fig. 3—Information from the daily drilling report is used to prepare this drilling-analysis graph which allows a detailed study of drilling costs and methods

tary Revolution Started" and "Rotary Revolution End." Tachometers are being installed with odometers which will permit the securing of this information. This information will be of value not only to the contractor but it will also tell the bit manufacturers something of the life expectancy of the bits under various conditions of load and speed under actual well drilling conditions.

Fig. 2 is a form prepared by the toolpusher prior to his phoning the office in the morning. This form is carried in a pocket-size loose-leaf book and is carried by the toolpusher at all times. At the conclusion of any well it gives a good history of the well and is available to the pusher as a guide on future work in the same locality.

In the office a large ledger sheet is carried on each well. This sheet has the same headings as the daily telephone report form. It is therefore very easy for the drilling foreman to simply call the office and read his report sheet. By using this form it is felt that no major operating factors are overlooked and that a fairly complete picture is given to the office in a minimum of time.

It will be noted from this form that "Days on Location," "Hours Rotated in Last 24 Hours," and that "Down Time" and "Causes of Down Time" have a preferred position on the sheet. It is felt that these are more important than the actual depth.

When the daily drilling report form reaches the office it passes through the following procedure. First, the payroll information is taken from it. Simultaneously with the payroll information, any accident reports are handled with the insurance company.

The information on the report is then tabulated on a master form in the office which not only permits the tabulating of the hours on each operation, but also has columns for the accumulated time for the various functions on the well. This information is then used in the preparation of the drilling-analysis graphs; a sample of which is shown as Fig. 3.

Drilling-Analysis Graphs

The left part of the chart pertains to daily operation. It will be noted that the top units are in days and that the vertical ordinates are in thousand feet drilled. The step line shows the daily progress on the well; that is, it shows that the well was started on October 11 and that the total depth was reached on November 26 at slightly past 8,100 ft. The solid line indicates the number of bits used during the well. The dotted line is the accumulated rotating hours, divided by 24 to bring it into days so that it can be compared to the overall time. The productive time includes not only the accumulated rotating hours and trip time in days, but also the accumulated time for cementing operations, special tests requested by the company, and any other time over which the crews have no control. Fishing time, or time lost due to breakdowns, is not included in the productive time. The ratio between productive time to daily progress is a measure of efficiency.

The center part of the chart shows the weight on the bit, the rotary r.p.m., the rate of penetration in feet per hour, and the slope of the hole from the top down to 8,000 ft. It will be noted that the rate of penetration is somewhat influenced by the weight on the bit and, secondly, by the rotary r.p.m. On the right-hand side of the chart a section is given over to mud characteristics; namely, mud pressure, mud viscosity, mud weight, and water loss.

While it is difficult to take any one chart and bring out the results of any particular change in operation, such changes become evident as more and more data are plotted. It is difficult to take one well and say that increasing the speed of the rotary will result in more footage per hour, but a study of many well charts indicates that the hole will be kept straighter, and consequently a greater average weight can be maintained which will result in a definite improved rate of penetration.

The results of water drilling versus drilling with a prepared mud are also very evident in these charts. Charts also corrobate that the room for big improvement in drilling operations is in the penetration of the chert formations. The chart also shows, however, that there is a marked slowing down in the rate of penetration above the point where the salt string is set and that improvement can and should be made in these zones.

A study of the charts also seems to indicate that there is a relationship between drill pipe size and hole diameter so as to obtain the best drilling rates. Sufficient data have not been obtained definitely to state what this relationship may be; however, there is an indication that considerable economy might be realized when this ratio is established and utilized.

As a further step in analyzing the charts on well performance, a form is now being prepared which will summarize the principal factors of performance of a group of wells. These factors will of course be obtained from the individual graphs and should present a picture which will either indicate a gradual improvement or the necessity of changes which will bring this improvement about.

When your crews run a string of J&L Casing or Tubing they are spinning in more than just the pipe. Each length represents many years of steel-making experience and is the best steel for your use that can be made. This combination assures you excellent service in the well.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH 30, PENNSYLVANIA

The RESISTIVITY CURVES

by Sylvain J. Pirson*

This article deals with the "resistivity" factors of electric-logging theory and application. Further material on this same phase will appear soon in later issues of the Journal. An article on the "self-potential" phase of electric logging, by Dr. Pirson, was published in the Journal issue of October 4, 1947.

BY definition, the specific resistivity of a medium is the resistance of a unit cube of this medium. Inasmuch as the resistance to current flow of an electric conductor is proportional to its resistivity times its length and inversely proportional to the cross sectional area available to current flow, the unit of specific resistivity will be expressed in ohms times the linear unit chosen. If in meters, the resistivity will be expressed in ohm times meters. If in feet, the resistivity will be expressed in ohm times feet. If in centimeters, the resistivity will be expressed in ohm times centimeters.

The resistivity so defined is the true resistivity of a medium. When measuring the resistivity of a finite sample or of a formation of finite dimensions with an electrode system of finite dimension, a resistivity which is apparent only is measured, but which is related to the true resistivity. In order to study how resistivity is measured it is necessary to consider the potential at a point due to a distant source within a homogeneous medium of uniform resistivity.

Potential at a distant point from a current source:

1. Half infinite medium—when a surface electrode is embedded in a half infinite medium (Fig. 1), consider the potential drop dV between two spherical shells of radii (r) and (r + dr).

We have by Ohm's law:

$$dV = -\frac{\rho I}{2\pi r^2}\,dr$$

(the minus sign is chosen because as we proceed along dr, V decreases.) Integrating between infinity and r, we obtain:

$$V_P = -\frac{\rho I}{2\pi}\int_{\infty}^{r}\frac{dr}{r^2} = \frac{\rho I}{2\pi r} \qquad (1)$$

where ρ is the resistivity of the medium and I is the total input current.

2. Full infinite medium.—For a full infinite medium, the line of reasoning would be the same as above, but instead of integrating over the surface of a half sphere, we integrate over the full surface of a sphere. Hence:

$$V_P = \frac{\rho I}{4\pi r} \qquad (2)$$

Earth resistivity from different well electrode systems.— Resistivity measurements in wells are always made through the use of commutated d.c. (pulsator) or a.c. current in order to avoid electrode polarization.

1. Three electrode systems:

A possible electrode setup in electric logging is indicated in Fig. 2 which may be called the inverted type where a current I is applied at A within the well and removed at B at the surface of the earth after passing throughout the formations. The potential difference ΔV is measured between points M and N located above the energizing electrodes A and B.

By application of the potential at a point Formula 2 and noting that

$$V_M = \frac{\rho I}{4\pi}\left(\frac{1}{AM} - \frac{1}{BM}\right) = \frac{\rho I}{4\pi a} \qquad (3)$$

since BM may be considered with respect to a.
Similarly:

$$V_N = \frac{\rho I}{4\pi}\left(\frac{1}{AN} - \frac{1}{BN}\right) = \frac{\rho I}{4\pi (a+b)} \qquad (4)$$

Hence:

$$\Delta V = V_M - V_N = \frac{\rho I}{4\pi}\left(\frac{1}{a} - \frac{1}{a+b}\right) = \frac{\rho I}{4\pi}\left[\frac{b}{a(a+b)}\right] \qquad (5)$$

from which the true resistivity (ρ) could be computed in the case of a perfectly homogeneous earth where the mud fluid has the same resistivity as the earth. However, those conditions are never fulfilled and the resistivity solution from the above formula yields only an apparent resistivity (ρ_a):

$$\rho_a = 4\pi\frac{\Delta V}{I}\cdot\left[\frac{a(a+b)}{b}\right] \qquad (6)$$

ΔV is normally obtained by potentiometric measurements whereas I is maintained substantially constant throughout a logging run. $4\pi a(a+b)/b$ is an instrumental constant which depends on the geometry of the electrode assembly.

Advantages

The standard type of three-electrode setup has the potential pickup electrode M and N, below the current electrode A. This has the advantage of probing to the very bottom of the well. It is indicated in Fig. 3. Formulas 3 to 5 apply naturally to this system also.

The reversed three-electrode system, which is the most commonly used electrode configuration, is pictured in Fig. 4. In this setup the current is applied at two nearby well electrodes A and B and the potential difference is measured between a surface electrode N and a well electrode M. The so-called normal curve is then obtained. We have:

$$V_{AM} = \rho I/A\pi a$$

and $V_{BM} = -\rho I/4\pi(a+b)$

Hence

$$V_N = V_{AM} + V_{BM} = \frac{\rho I}{4\pi}\left(\frac{1}{a} - \frac{1}{a+b}\right) = \frac{\rho I}{4\pi}\cdot\frac{b}{a(a+b)} \qquad (7)$$

Inasmuch as the surface electrode N

*Head of division of geophysics and geochemistry, Pennsylvania State College.

Electric Logging: Diagrams and Symbols of Various Electrode Arrangements

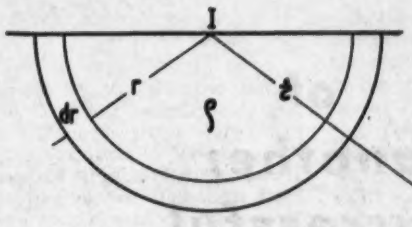


Fig. 1—The potential at a point caused by a current I on the surface of the ground is IP/2πr². In a medium infinite in all directions it would be IP/4πr

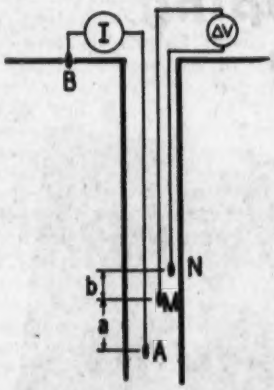


Fig. 2—Inverted three-electrode logging system

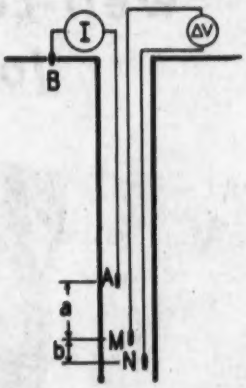


Fig. 3—Standard three-electrode logging system

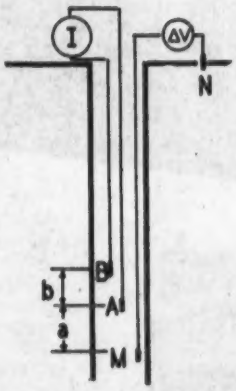


Fig. 4—Reversed three-electrode logging system

Fig. 5—Reversed inverted three-electrode logging system

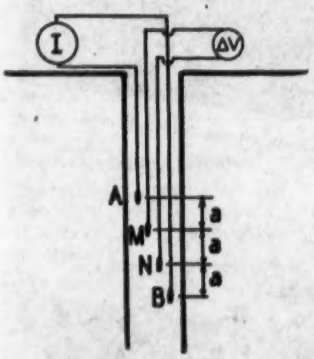


Fig. 6—Symmetrical normal four-electrode logging system with equal electrode spacing

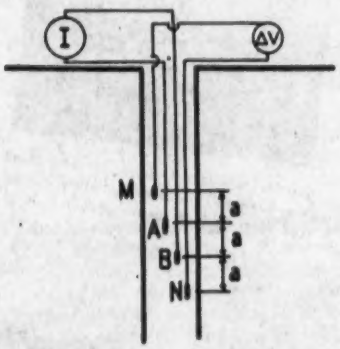


Fig. 7a.—Symmetrical inverted four-electrode logging system with equal electrode spacing

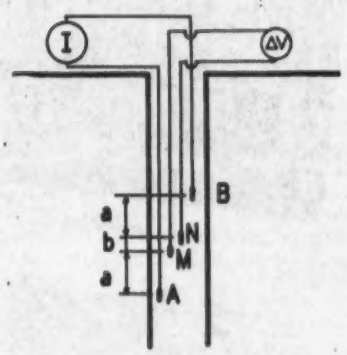


Fig. 7b.—Symmetrical normal four-electrode logging system with unequal spacing

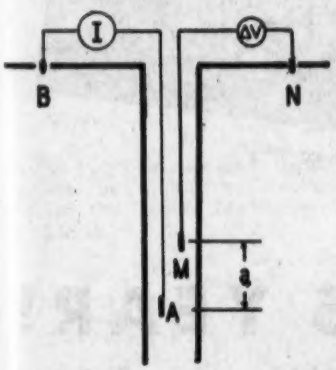


Fig. 8—Inverted two-electrode logging system

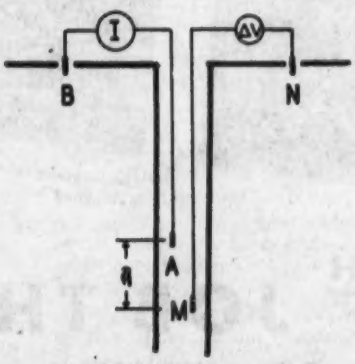


Fig. 9—Normal two-electrode logging system

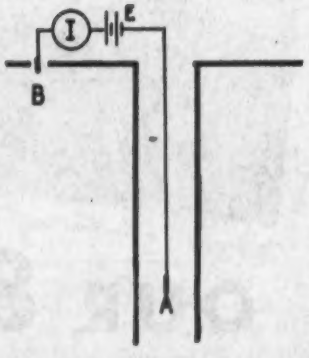
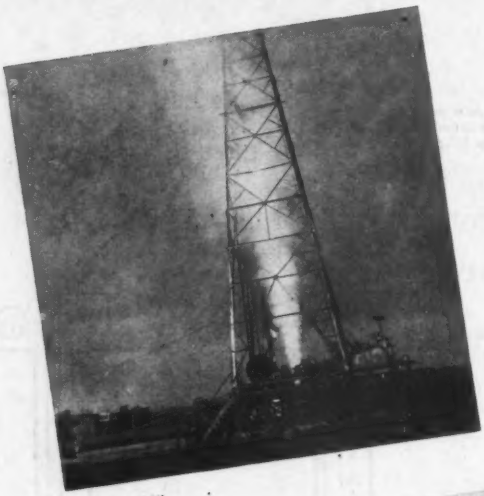


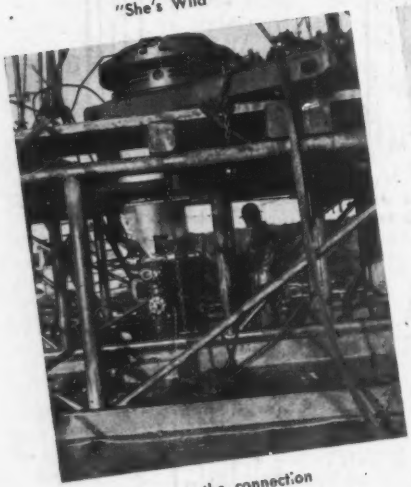
Fig. 10—Mono electrode logging system

PICTURES TELL THE STORY

of another successful well-capping job!



"She's Wild"



Sand cutting out the connection

Derrick moved off, showing valve that was used to close well in before casing cut out 5 feet below ground level

After cutting off the Braden Head

Getting ready to recap the well

Liner placed over hole in casing and well closed in

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has a certain unknown potential Vn with respect to ground, we have

$$\Delta V_{MN} = V_N - \frac{\rho I}{4\pi} \cdot \frac{b}{a(a+b)} \qquad (8)$$

If conditions are stable at the surface electrode, Vn will remain constant, and the S.P. curve so measured will record the variation in V_M only. The advantage of this electrode system is in its freedom of induction from the energizing circuit to the pickup circuit, owing to the nearness of the parallel energizing wires which are circulated by currents of equal intensity and opposite in direction.

The reversed-inverted three electrode system represented in Fig. 5 applies the current at two electrodes A and B below the potential pickup M. This system has the disadvantage of being unable to probe to the very bottom of the well. However, the resistivity relationships are identical to those found in the preceding set up.

Another combination of electrodes in the three electrode system is possible, namely where the pick-up electrode M is located somewhere between the two current electrodes A and B. If the pick-up electrode and a current electrode are relatively close together compared to the distance to the second current electrode, the system will perform as a two electrode probe.

In these systems the surface electrode potential V_N is often negligible and if not, a new location for the surface electrode should be sought or the potential V_N should be compensated for.

2. Four-electrode systems:

A. Normal system. — In this case the energizing current is applied at A and B outside the pick up electrodes M and N.

a. For equal spacing between electrodes (Fig. 6), we have the following relationship:

$$\Delta V_{MN} = \frac{\rho I}{4\pi}\left(\frac{1}{a} - \frac{1}{2a} - \frac{1}{2a} + \frac{1}{a}\right)$$

$$= \frac{\rho I}{2\pi a} \qquad (9)$$

Hence:

$$\rho a = 2\pi a \cdot \frac{\Delta V_{MN}}{I} \qquad (10)$$

b. For unequal spacing between electrodes but symmetrical with respect to the center of the probe: (Fig. 7"B".)

$$\Delta V_{MN} = \frac{\rho I}{4\pi}\left(\frac{1}{a} - \frac{1}{a+b} - \frac{1}{a+b} + \frac{1}{a}\right)$$

$$= \frac{\rho I}{4\pi} \cdot \frac{b}{a(a+b)} \qquad (11)$$

Hence:

$$\rho a = 2\pi \frac{a(a+b)}{b} \cdot \frac{\Delta V_{MN}}{I} \qquad (12)$$

B. Inverted system.—In this case the energizing current is applied inside the pickup electrodes (Fig. 7"A"). By virtue of **reciprocity theorem,** Formulas 9 to 12 are applicable.

3. Two-electrode systems:

In this setup the current is applied between a surface electrode B and a well electrode A. The potential is measured between a surface electrode N and well electrode M. (Fig. 8.)

A. Inverted system.—In this case, the current electrode is at the bottom:

$$\Delta V_{MN} = \frac{\rho I}{4\pi}\left(\frac{1}{MA} - \frac{1}{MB}\right)$$

$$+ V_N - \frac{\rho I}{4\pi}\left(\frac{1}{NA} - \frac{1}{NB}\right)$$

But MA, NA and NB are large; hence:

$$\Delta V_{MN} = \frac{\rho I}{4\pi} \cdot \frac{1}{MA} + V_N = \frac{\rho I}{4\pi a} + V_N$$

$$\rho = 4\pi a \frac{\Delta V_{MN} - V_N}{I} \qquad (13)$$

B. Normal two-electrode system with potential electrode at the bottom. (Fig. 9.) The same formula as for the inverted two-electrode system applies, but the configuration has the advantage of probing to the very bottom of the well.

In the two-electrode systems, the surface electrode potential V_N is often negligible and if not must be compensated for.

4. Single-electrode system (Fig. 10):

In this system a current is passed between a surface electrode B and a well electrode A, the variations in total resistance of the circuit are recorded. Essentially, these variations are confined to the neighborhood of the well electrode. It has been shown by Peters* that the resistance R of a grounded electrode is given by:

$$R = \frac{\rho}{2\pi C} \qquad (14)$$

in which:

R = resistance to flow of current away from an electrode with the return electrode located at a great distance.

ρ = resistivity in ohm × centimeter of the uniform, homogeneous and isotropic ground around the electrode.

C = combined **electrostatic** capacity in free space of the electrode and its image above the surface of the earth.

A. Case of a hemispheric electrode, buried in the earth with its flat side flush with the surface of the earth. The image is the other half of the sphere. As the electrostatic capacity of a sphere of radius r expressed in **cm** is numerically expressed by the radius itself, we have C = r. Hence:

$$R = \frac{\rho}{2\pi r} \qquad (15)$$

B. Case of a complete spherical electrode embedded in a medium of resistivity ρ. In this case, Formula 14 requires a 4 in the denominator instead of a 2 because we deal with a full infinite medium. The capacity of a sphere being equal to its radius in centimeters, we have:

$$R = \frac{\rho}{4\pi r} \qquad (16)$$

In measuring resistivity by the monoelectrode system it can be assumed that the well electrode approaches the spherical shape. The resistance of a spherical electrode as given by Formula 16, indicates that there are two controlling factors, namely, the electrode radius r and the resistivity ρ of the material into which it is embedded. In the monoelectrode logging system, we measure, under a constant driving voltage the variations of current I passing through the earth from the surface electrode onto the well electrode. It is assumed that the resistances of the surface electrode and of the earth do not vary, the variations in I resulting altogether from variations in R. Hence, R = E/I where E is the applied voltage and I is the resulting current. By substitution of R by its value, we obtain:

$$\frac{\rho}{4\pi r} = \frac{E}{I}$$

Solving for ρ we have:

$$\rho = 4\pi r \frac{E}{I} \qquad (17)$$

in which $4\pi r$ is an instrument constant. Under the application of a constant voltage, the variations in I are inversely proportional to resistivity Measurements can also be made by means of a constant current source by recording the variations in voltage E required to maintain I constant. It can be visualized that the single-point resistivity curve is a measurement, of the resistivity of the well fluid in which the well electrode is embedded more or less affected by the presence of the geologic formations.

*Peters, O. S., "Resistance to Earth of Ground Connections," Nat. Bureau of Standards, T.P. 108, pp. 219-220.

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QUESTIONS on TECHNOLOGY

by W. L. Nelson

Consulting Engineer

This department was created for the purpose of aiding managers, superintendents, engineers, chemists and all those engaged in various phases of plant operation, as well as those connected with the marketing and utilization of petroleum products. Readers are invited to submit their problems to W. L. Nelson, technical editor. Inquiries must be signed, but only the initials will be printed.

Fumes From Asphalt Oxidation

I am in search of a method of disposal of fumes from asphalt oxidizers. Will you please furnish me with references and literature concerning this or the principle on which these absorbers have been built?—I. L.

Little has been written on the disposal of the fumes of asphalt "blowing." However, S. S. Parker, in "Insulation Technique for Oil-Refinery Structures" (The Oil and Gas Journal, page 160, April 26, 1947) mentions that exhaust gases and smothering steam from asphalt tanks are withdrawn and passed through two fume-absorbing towers and that coke is used in these towers to absorb noxious corrosive waste gases. The action of coke is only slightly that of an adsorbent and hence its action is mainly that of a mechanical scrubber or mist extractor as well as a washing or solvent action by such water as condenses in the coke tower. Coke-packed towers are also used in eliminating the fumes of lubricating-oil treating processes.

According to Thurston and Knowles (Ind. Eng. Chem. 28, 1936, page 88 or J. Inst. Pet. Tech. 22, 1936, page 106A) the oxidation of constituents of soft Mexican asphalt proceeded as indicated in Table 1.

TABLE 1—OXIDATION OF THE CONSTITUENTS OF SOFT MEXICAN ASPHALT

	Original asphalt	Asphaltenes	Asphaltic resins	Petroleum resins	Oils
Oxygen, used, % of sample	17.3	23.6	1.85	15.4	13.4
Change in wt., % of sample	—5.0	plus 2.7	—2.3	—3.67	—2.8
Oxygen absorbed, % of sample	...	23.6	...	...	...
Oxygen as water, %	67.9	59.6	71.3	72.1	71.5
Oxygen as carbon dioxide, %	14.2	12.9	10.7	9.2	8.9
Oxygen unaccounted for, %	17.9	3.9	18.0	18.7	19.6

Although the main products of oxidation are water and carbon dioxide, the smaller amount of product that appears as acidic materials, aldehydes, and hydrogen sulfide are a nuisance. Such materials are particularly troublesome when partially reduced materials are blown.

Expensive Process

Adsorption by means of activated charcoal, fuller's earth, etc., is usually too expensive and in addition they require condensation of the large amounts of steam contained in the gaseous mixture.

Quoting from Holland (Reference 7 of June 1935) under the heading of Vapor Disposal System:

"Some 10 to 12 ft. out in front of each 9 or 10 converters there are set up in series flow two vapor-scrubbing drums 4 ft. in diameter by 30 ft. high. Each contains six perforated baffle trays welded into position on angle-iron supports 5 ft. apart. Over them comes down from the top a full stream of water from a 1½-in. diameter supply pipe. The oxidized waste vapors and gases from the 9 to 10 converters pass upward from bottom to top of each drum in series and in countercurrent direction to the water flow. These vapors and gases reach the scrubbing drums by means of a 12-in. main line manifolded to all the vapor lines from the 9 to 10 converters in a set.

"Out of the last drum the waste gases pass from the top by an 8-in. line, thence to a 16-in. underground main line. This connects with all scrubbing drums for the 31 converters and enters at the bottom of a concrete stack 225 ft. high by 6 ft. in diameter at the base. Out of the top of this stack comes a white vapor. Due to the height it quickly dissipates into the upper atmosphere, leaving no noticeable odor in the neighborhood.

"From the bottom of each vapor scrubbing drum a constant stream of oily water emerges through a 4-in. siphon pipe drawoff, set so as to maintain a 3-ft. liquid level in the bottom of each drum. This waste of oil and water goes by gravity flow to the refinery sewage and drainage system and finally into the oil trap where the oil is recovered for refinery fuel.

"Due to the corrosive nature of the vapors and gases, the drums have their interiors covered with gunite. Cast-iron baffle plates not protected were eaten out over a period of several months. The welded-in angle irons supporting them also when not gunite protected would eat out quickly."

Scrubbing with water seems to be extensively employed but it would appear to be expensive because all of the steam is condensed.

Waste gases have also been controlled by confining them in a closed system and piping them to be burned in an industrial furnace, burned in a specially built waste-gas furnace, or disposed of in a stack along with the flue gases of any furnace. Stacks as tall as 160 ft. have been used to carry the gases to altitudes well above the ground.

No direct references to the handling of asphaltic oxidizer fumes have been located but several general references are listed here. W. B. Hart of Atlantic Refining Co., Philadelphia, has been interested in the disposal of refinery wastes for many years.

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1. A.P.I.—Disposal of Refinery Wastes. Section 2, Waste Gases, Vapors, Sludges and Dusts.
2. Burroughs, L. C.—Disposal of Refinery Wastes, Pet. Refiner, July 1946, p. 81.
3. Brumbaugh, A. K.—Smokeless Burning of Vent Gases, Pet. Processing, March 1947, p. 168.
4. Hess, R. W.—Bibliography on Chemical Wastes, Ind. Eng. Chem. 39, 676 (1947).
5. Hart, W. B.—Series of Articles on Disposal of Petroleum Refinery Wastes, Nat. Pet. News and later Pet. Processing from Jan. 2, 1946, to date.

Fuel Sensitivity

What is meant by "sensitivity" in talking of motor fuels?—R. M. C.

Sensitivity is beginning to be used as an indication of the relation between the low-speed and high-speed knock characteristics of gasolines. It is defined simply as the difference between the research and motor-method octane numbers. Most automotive engines tend to knock at low speeds but knocking generally decreases rapidly at higher speeds. Good-sensitivity gasolines do not tend to knock at low speeds. However, there is indication that they lose this quality at high speeds and in fact may become very susceptible to high-speed knock. According to Risk, Jordon, Alspaugh and Fuller, "The Relation of Motor Fuel Sensitivity and Tetraethyl Lead Susceptibility to Road Antiknock Performance," Fifteenth Mid-West Regional Meeting of American Chemical Society, Kansas City, June 24, 1947, tetraethyl lead is more effective in increasing the high-speed performance of typical full-boiling-range motor fuels than it is in improving their low-speed characteristics, especially in fuels of low sensitivity.

NEW Invisible Eyes IN LIQUID-LEVEL CONTROL— GAMMA RAYS

by Leigh S. McCaslin, Jr.

This article is the second of several intended to bring the reader up to date on new instrumentation and inspection developments resulting from wartime research. Two instruments for nondestructively measuring thicknesses were discussed in last week's issue —one utilizing gamma rays for its operation and the other mechanical resonance. (See "Gamma Ray and Supersonic Equipment-Inspection Methods Used in Continental Oil's Eight Refineries.")

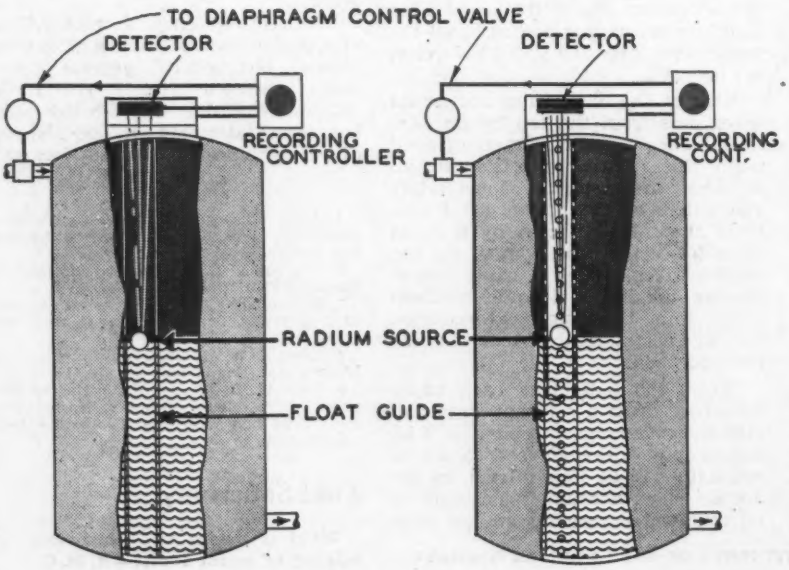
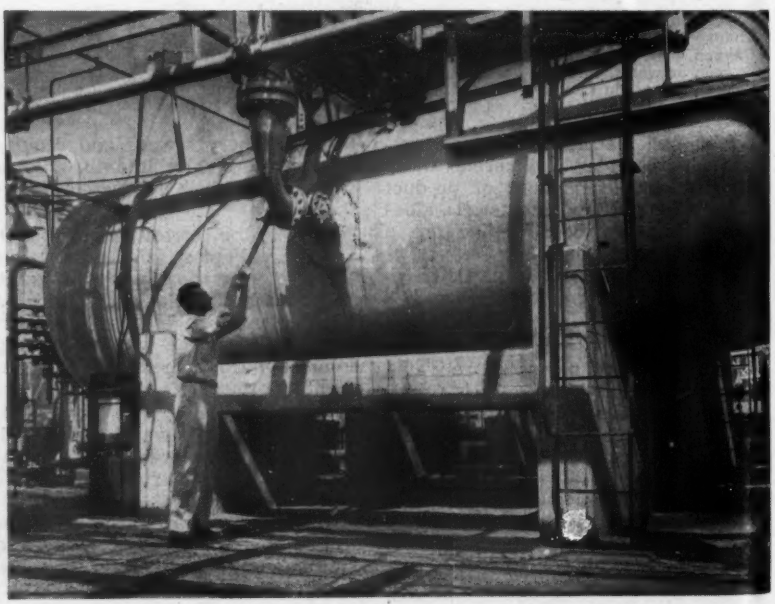


Fig. 1—(Left) Two installations of the new gamma ray device—the Gagetron—for keeping continuous record of a variable liquid level. No stuffing boxes or through-the-wall connections are used. Fig. 2—(Below) Operator opens valve on wash tank which is equipped with Gagetron to act as an alarm to prevent salt water carrying over into the furnaces

FIRST installation of a new gamma-ray device for the measuring, recording, and controlling of liquid levels has been made in a Tulsa refinery. This radically new device, called the "Gagetron" by its originators, makes it unnecessary to have connections of any kind from the outside to the inside of the containing vessel to measure, record, or control liquid levels.

In the past, liquid-level indication and control have presented problems to the industry engineers from corrosion and sometimes other standpoints due to the nature of the liquid in question. For example, highly corrosive liquids, such as hydrofluoric acid, are at best difficult to hold in a container; the addition of openings in the vessel wall for installation of the usual liquid-level control components can further complicate an already difficult problem.

The Gagetron utilizes the tremendous penetrating power of gamma rays in its operations. This penetrating



power is the means of making it possible to indicate liquid levels without any connections between the outside and inside of the containing vessel. Principal components of the instrument are a gamma ray source (an iridium-platinum needle containing a minute quantity of a commercially available radium salt) and a gamma ray detector (a counter of the Geiger-Mueller type). By combining the Gagetron with a standard recording controller - motor diaphragm system, it is possible to maintain a predetermined liquid level or to make a continuous graphic record of the liquid level.

Sludge Depropanizer Installation

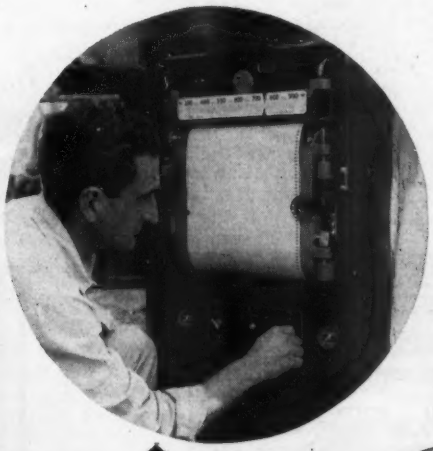
At the Tulsa refinery, the Gagetron has been installed on two types of equipment—a sludge depropanizer and a wash tank used in the desalting of crude prior to fractionation. The sludge depropanizer installation was made first as it was considered to be the more difficult and the one which would give the better test of the Gagetron.

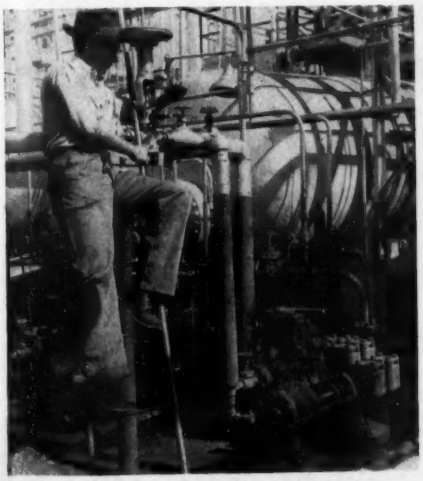
Prior to the Gagetron installation, a mechanical float was used to control the level of sludge in the depropanizer. When the level became too high, the mechanical float would throttle air to a diaphragm control valve which in turn varied the amount of steam to the discharge pump on the depropanizer. However, two difficulties were encountered with this control system: (1) The steam used for treatment in the unit caused a layer of foam on top of the sludge. This layer of foam, with its decreased density, caused the float to give inaccurate readings. At some densities the float would be suspended in the foam rather than at the top level of the sludge. (2) The level of the solution in the depropanizer is agitated violently with open steam causing the float to fluctuate rapidly. This action, plus corrosion due to the sulfuric acid used in treatment, caused the float arms inside the vessel to break at frequent intervals. Breakages were occurring at the approximate rate of one every 2 weeks. This breakage, of course necessitated a shutdown of the unit and thus proved costly.

This unit was considered a good installation to test the practicability of the instrument because of the various materials which the gamma rays must penetrate to reach the detector unit. These materials include 4 in. of fire brick, ¼ in. of lead, and three steel plates ⅜, ¾, and 1 in. thick. Lead, of course, is a good absorber of gamma rays, and there was some question as to whether or not sufficient rays would penetrate to actuate the detector unit.

In installing the Gagetron, the radium source was permanently mounted on a bracket inside the depropanizer (see Fig. 3) and the

(Continued on page 118)





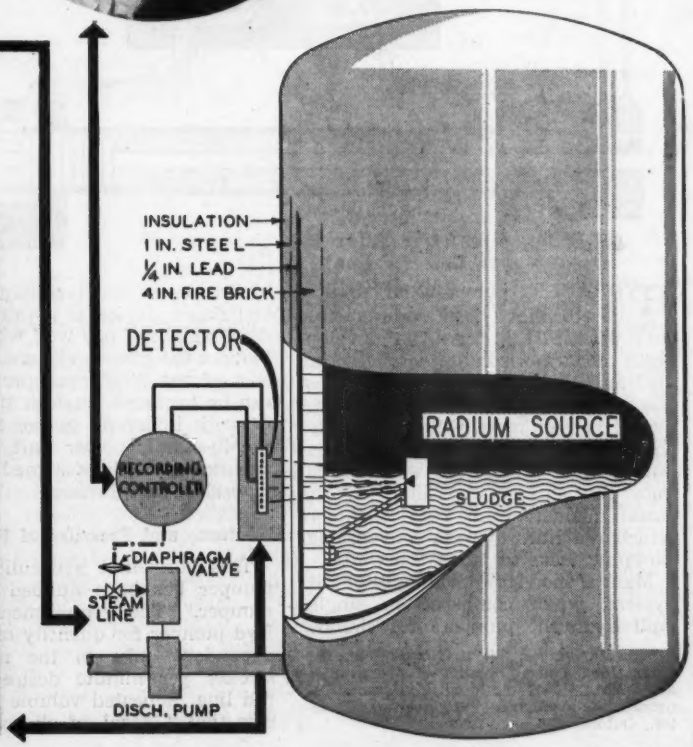
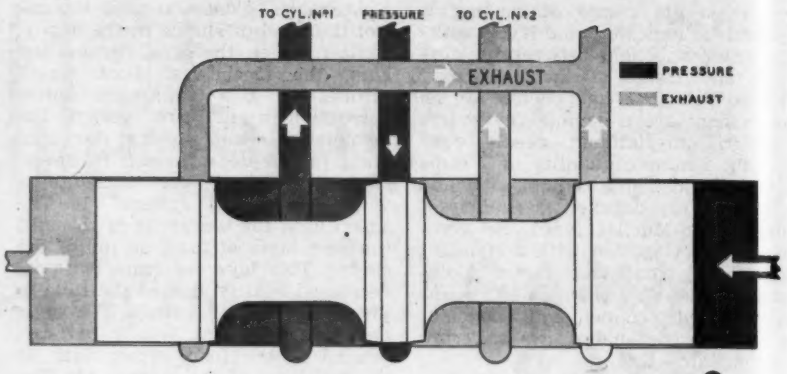
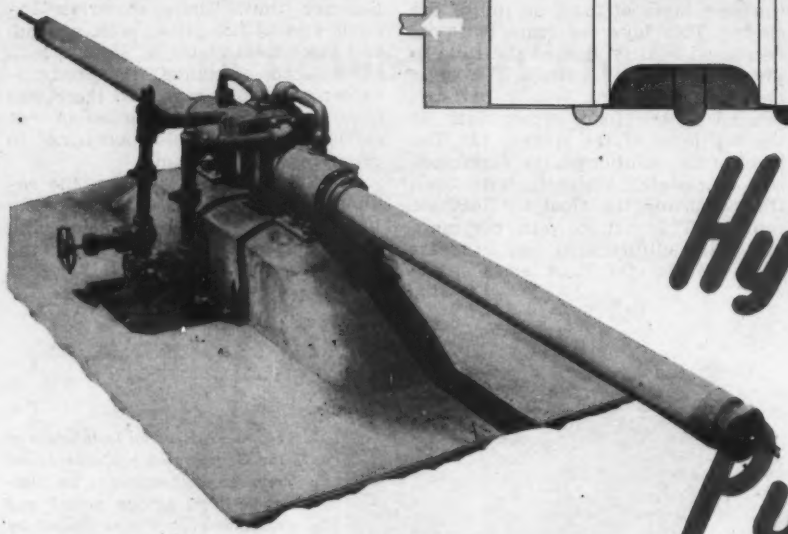


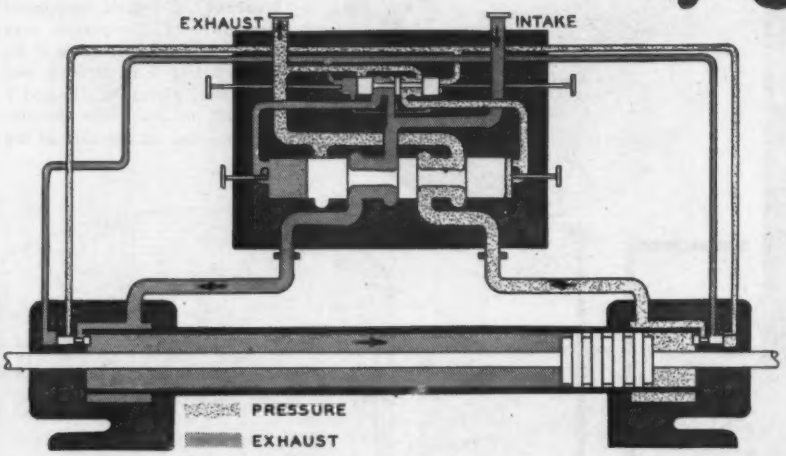
Fig. 3—This initial installation of the Gagetron on a sludge depropanizer unit maintains an automatic level in the vessel and eliminates down time caused by breakage in control equipment formerly used. The gamma rays inside the tank penetrate 4 in. of fire brick, ¼ in. of lead, and three steel plates ⅜, ¾, and 1 in. thick to reach the detector unit mounted on the side of the vessel

Fig. 1—(Bottom) Flow diagram of Hyd pumper showing one position in its operating cycle. (Center) Horizontal, double-acting hydraulic cylinder which actuates surface rod lines. Fig. 2—(Right) One of the three methods used to provide smooth, gradual reversals of stroke in the pumper. This is an "open center" effect in the master valve spool with pressured oil flowing in opposite directions to provide cushioning effect





Hydraulic Pumpers for SHALLOW WELLS



*by A. A. Hardy**

HYDRAULIC pumpers for shallow oil wells have been made possible and practical through the development of a horizontal, double-acting hydraulic cylinder which is placed in the conventional surface rod line between two or more wells. By applying hydraulic power oil under pressure to this cylinder, it will reciprocate the surface rod lines in the usual manner, from 1 to 20 s.p.m., which rod lines operate conventional pumping jacks to pump the wells.

Main economical advantages of this system, when compared to single-well hydraulic pumpers for shallow wells, lies in the fact that no counterbalance device is required, as the dead weight of one well will counterbalance the other well; and the initial cost of the single pumping cylinder can be prorated between the number of wells it pumps, as can the cost of the hydraulic power unit, which incidentally, can be designed to handle several such cylinders.

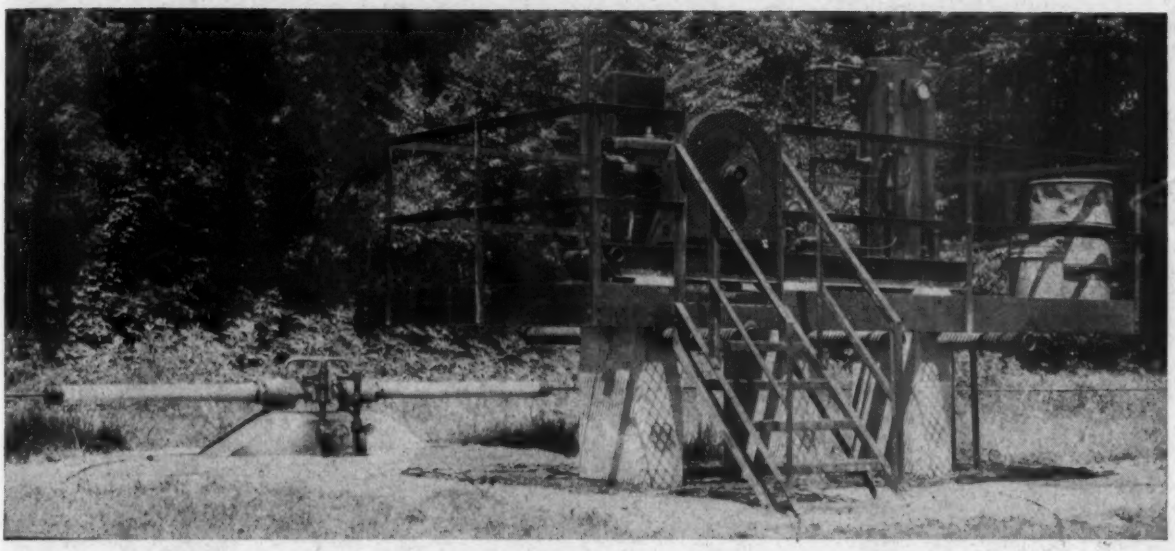
*Chief engineer, W. C. Norris Manufacturer, Inc., Tulsa. Portion of presentation at A.S.M.E. 1947 national conference on petroleum mechanical engineering, Houston, October 5-8.

Volume and Pressure of Power Oil

This horizontal hydraulic rod line pumper has been dubbed the "Hyd pumper." The requirements of the Hyd pumper for quantity of fluid are dependent only on the number of strokes per minute desired for the rod line. Repeated volume tests indicate that 2.17 gal. of oil are required for one complete cycle or stroke at a 24-in. piston travel, and an average speed of 8 s.p.m. This indicates a volumetric efficiency of 94 per cent.

Pressure required at the Hyd cylinder to actuate the rod lines is a function solely of the net rod-line pull and the area of the Hyd-pumper piston. Net rod-line load equals the fluid load lifted at the well, plus the impulse load, plus the rod-line friction. The Hyd-pumper cylinder is 3¾-in. diameter with a 1¼-in. rod giving a net area of 9.8 sq. in. For purposes of estimating we divide the rod-line load by 10 to obtain the pressure required. This is about 2 per cent low, but inasmuch as about 75 psi. must be added to the result to take care of rise in pressure for tripping at the end of the stroke, the results are satisfactory.

In figuring rod-line loads, the wells to be pumped with each Hyd cylinder should be divided into the two opposing groups taking into consideration their weights, pumping period, and future life characteristics,



Complete Hyd pumping unit showing pumping cylinder at left and hydraulic power unit on raised steel platform to right. Hydraulic power unit can be designed to handle several pumping cylinders

as well as any other production factors that may be evident. Next the rod-line pull for each of the opposing systems should be figured and calculations for pressure required then made on the heavier system. The lighter system can be counterbalanced later to equal the same figure. In figuring polished-rod loads, the Slonneger† Formula 2 has been found quite satisfactory.

In figuring rod-line friction, the values given in the accompanying table may be used. It is based on flat rod lines with fairly well-lubricated rod-line carriers. If the rod lines approach the catenary curve, proper judgment should be used in reducing the assumed loss. Friction through swings varies with the angle of the swing. Assuming well-designed and lubricated swings, the loss will vary about 0.1 per cent of the gross rod-line pull for 15° swings, to 1 per cent of the gross rod-line pull for 180° swings. Multipliers will require about 0.5 per cent of the gross rod-line pull. These figures are based on gross rod-line pull which includes the dead weight of the sucker rods. For our purposes, when we deduct such dead weight and use the net effective pull as herein outlined, the above friction losses can be doubled under average conditions with little loss in accuracy.

In outlining the methods of estimating rod-line loads, we have assumed that the opposing ends of the rod lines are balanced. This is the ideal, or proper manner in which to operate. As far as the Hyd cylinder is concerned, it will operate satisfactorily under unbalanced conditions, the only result being that the pressure required in one direction will be greater than that required in the opposite direction. As a matter of fact, we have experienced occasions of rod-line breaks, and the pumper has continued operating, where the hydraulic relief valve was set high enough to permit it to do so. On the other hand, if it is desired that the unit stop under such conditions, it will be caused to do so by setting the relief valve slightly above the maximum pressure required for normal operation.

†J. C. Slonneger, Continental Supply Co., Dallas. Polished-rod load =

$$(W_r + W_o)\left(1 + \frac{S \times S.P.M.}{5{,}400}\right)$$

Where

W_r = weight of the sucker rods
W_o = weight of the oil = $0.34D^2 \times L$
S = polished-rod stroke in inches
S.P.M. = strokes per minute
D = diameter of plunger in inches
L = depth to fluid level in feet

ROD-LINE FRICTION LOSS

Pull rod size (in.)	Friction loss in lb per 100 ft. of rod line: Wood carriers	Friction loss in lb per 100 ft. of rod line: Average antifriction carrier
⅝	30	..
¾	44	14
⅞	81	17
1	116	21

Selection of the Power Unit

Summing up the above we find that the quantity of power oil required in gallons per minute is equal to the number of strokes per minute required for the rod lines times 2½. The pressure required in pounds per square inch at the Hyd cylinder equals the net rod-line pull divided by 10 plus 75. To this pressure should be added the line friction loss of the hydraulic oil from the power unit to the Hyd cylinder. This can be figured by conventional means.

If more than one Hyd cylinder is used for one power unit, flow-control valves or needle-type adjusting valves must be used to prevent one cylinder from robbing another. This is very important.

A typical power unit consists of a rotary high-pressure pump, V-belt driven by a horizontal single-cylinder engine, a reservoir open to atmosphere, a high-pressure, balanced piston-type relief valve and the necessary piping, all skid mounted. The size of the engine and pump are determined by the gallons per minute and pressure required as outlined above. The reservoir should have a capacity at fluid level of 1½ to 2 times the gallons per minute. Various controls may be included as desired, such as low level cutoff as shown and high-temperature cutouts.

Design of the Hyd Pumper

Basically, the design of the Hyd pumper consists of a double-acting hydraulic cylinder whose reversals are effected by means of a conventional straight-line, lobed, piston-type four-way master valve. The reversals of the four-way master valve, and in turn the main piston, are effected by a pilot valve which alternates the intake and exhaust pressure on the ends of the four-way master valve.

The pilot valve is also a four-way valve of the same type as the master four-way valve. The reversals of the pilot valve, in turn, are effected hydraulically by small spring-loaded pistons inserted in each cylinder head of the main cylinder. At the end of the main piston stroke, the main piston depresses this small inserted piston, which in turn forces oil under super-pressure to one end of the pilot valve piston and opens the other end of the pilot valve piston to exhaust, thus causing its reversal.

This system of effecting reversals is entirely conventional with all re-

(Continued on page 121)

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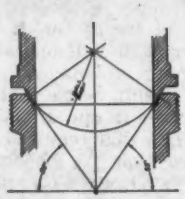
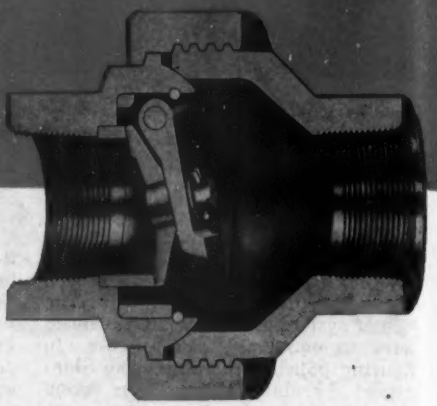


BALL-TO-ANGLE SEAT



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Evaluation of Water-Resistance Properties Of Lubricating Greases

by T. G. Roehner and E. S. Carmichael**

The term "water resistance" is often loosely applied when describing the properties which a lubricating grease should have, in order to give satisfactory performance where exposure to water will occur. It is true that the ability of the grease to resist washout from the bearings and its corrosion-prevention characteristics are both related to water-resistance properties, but confusion in recommendations may be avoided if recognition is given to the fact that the grease which resists washout best may not also satsifactorily protect the bearings from serious rusting. For both of these requirements it is not unusual to find that recommendations are based primarily on the metallic radical of the soap component of the grease. Calcium, aluminum, lithium, and barium are regarded as inherently resistant to water, while sodium is avoided where that characteristic is desired. Selection of greases on that basis will not consistently assure satisfactory products, because experience has demonstrated that other components of the lubricants may possibly have equal or more important effects.

A major difficulty in evaluating the relative effects of each of the various factors involved is the lack of agreement regarding laboratory test methods and their limitations. Products which show outstanding performance in certain tests have been failures and vice versa when used under actual service conditions.

Data Sometimes Misleading

From a broad viewpoint, the test data have been misleading in some instances because sufficient allowance has not been made for the relative importance of so-called water-repellency and water-absorption characteristics. The former may be the determining factor when resistance to washoff is of interest, or, in other words, when water flows over the grease at a rate which will not remove the lubricant by physical force alone. Water-absorption properties is a loose term applied to those characteristics which are the predominating factor when resistance to washout from the bearings is of interest. Under service conditions, water-repellency properties are a function of the ability of the excess grease, particularly that adhering to the outside of the bearing, to act as a seal preventing the entrance of water in the bearing. After the water is entrapped in the bearing and is worked into the grease by movement of the bearing, water-absorption properties come into play as they, by definition at least, determine how much water will be retained, and with what effect on the structure of the grease and its ability to stay put.

Resistance to washoff is often determined by using plate-immersion or dip tests. Samples are smeared uniformly over plates and observations and/or loss of weights are noted after the coated plates have been dipped in the test water under prescribed conditions. In this type of test, conventional calcium, aluminum, and lithium-base greases, for example, will show good repellency while conventional sponge greases made with soda tallow soap will wash off quite rapidly.

Methods Employed

The methods employed for evaluation of resistance to washout provide for working water into the grease. Probably the two best known methods of this type are those included in certain Army-Navy Aeronautical Board Specifications, i.e., the water-absorption test described in AN-G-3a and AN-G-10 and the water-resistance test given in AN-G-5a, AN-G-15 and AN-G-25.

The water-absorption test was developed by the Naval Engineering Experiment Station at Annapolis. Test equipment consists of a vertical steel shaft having a mushroom head $1\frac{7}{8}$ in. in diameter and ¼ in. thick attached in a vertical position to an electric motor rotating at about 1,200 r.p.m. Twenty grams of the grease sample are placed in a cylindrical flat dish $2\frac{3}{4}$ in. in diameter and $1\frac{1}{2}$ in. deep. Then distilled water is added to the grease in 1 ml. portions. The grease is worked between each addition of 1 ml. of water until inspection shows that no further water will be taken up. Each milliliter of water is equivalent to 5 per cent of water. The amount of working which the sample receives is quite drastic and is intended to be equivalent to that which the grease would be subjected in a bearing in service.

The water-resistance test may be best described by quoting the procedure given in AN-G-15.

"A No. 204K Conrad-type ball bearing shall be packed with 4.0 g. of grease and clamped in a tight-fitting housing which allows the inner race to turn freely, mounted on a horizontal shaft, and rotated at 600 r.p.m. A fine stream of distilled water, initially at room temperature and not permitted to exceed 120° F., circulating at the rate of 5 ml. per second, shall be directed against the end plate of the housing from a 1-mm. capillary connected to a pump taking suction from the reservoir of water under the bearing so that it impinges on the end plate ¼ in. above the outer opening of the bearing housing. Operation shall be continued for 1 hour when the bearing shall be removed, dried at 180° F., and reweighed to determine the grease loss. This grease loss divided by the weight of the grease used in packing the bearing shall be reported as the per cent grease loss."

Data obtained from laboratory evaluations of the above-mentioned types, but particularly experience in the field, have indicated that the ability of greases to resist washout from bearings operated under service conditions is dependent on the following factors:

1. Metallic component of soap (calcium, soidum, etc.).
2. Fatty component of soap (oleate, stearate, etc.).
3. Mineral oil (viscosity, degree of refinement, etc.).
4. Reaction of finished grease (free acid or alkali).
5. Additives (rust and oxidation inhibitors, etc.).
6. Bearing design (sealed, open, etc.).
7. Operating conditions (temperature, frequency of application of grease, etc.).

Preparation of Samples

Samples used for the tests covered by Table 1 were prepared so that they differed essentially in only one respect, i.e., the alkaline base used for the saponification of the stearic acid. All of the greases included in Tables 1 and 2 were made with the same mineral oil having a viscosity of 105 seconds at 100° F.

It will be observed that when tested by the so-called AN-G-5a procedure, the amount of washout of the calcium, aluminum, and lithium stearate greases was quite small. The sodium stearate grease emulsified to

*Socony-Vacuum Laboratories, Technical Service Department.

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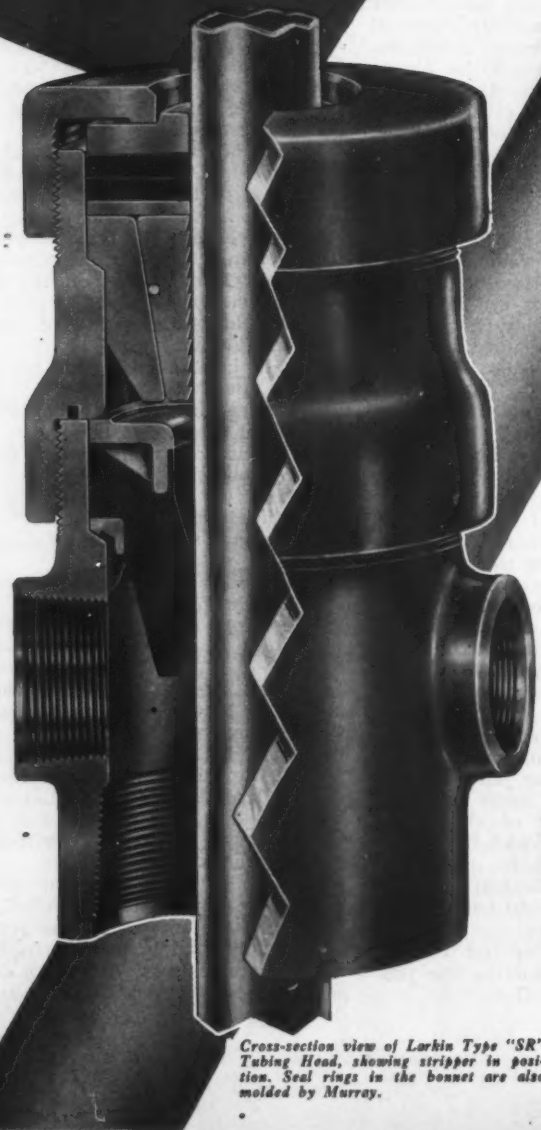

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TABLE 1—EFFECT OF METALLIC COMPONENT OF SOAP AND WATER RESISTANCE OF GREASES

Soap content: 13-15 per cent
Approx. unworked and worked penetrations at 77° F.: 250

Grease soap base—	AN-G-5a procedure grease loss (%)	Navy water absorption procedure water absorbed (%)
Calcium stearate ..	Nil	25
Sodium stearate	25	35
Aluminum stearate.	Nil	20
Lithium stearate ..	3	20

TABLE 2—EFFECT OF ORGANIC COMPONENT OF SOAP ON WATER RESISTANCE OF GREASES

Soap content: 13-15 per cent
Approx. unworked and worked penetrations at 77° F.: 250

Grease soap base—	AN-G-5a procedure grease loss (%)	Navy water absorption procedure water absorbed (%)
Sodium stearate	25	35
Sodium stearate-oleate (stearic acid-oleic acid ratio, 50-50)	30	100+
Sodium oleate	90	100+

a considerable extent and the loss of product from the bearing was appreciably higher. In the so-called Navy water-absorption test, the same three greases retained water to about the same extent with the sodium stearate product showing a somewhat higher percentage.

It is often assumed that all sodium-base greases will form emulsions which will flow like liquids from the bearings and leave no residue. Actually, wide differences have been noted with changes in composition of the greases. In Table 2, sodium oleate grease showed much less resistance to water than the corresponding grease made with the soap of a high-titre fatty acid, i.e., stearic acid. In the water-absorption test, the sodium stearate grease acquired the consistency of a firm paste whereas the sodium oleate product was converted to a comparatively thin emulsion. In the case of other types of greases, water resistance is also determined to some extent by the chemical composition of the organic component but this factor is more readily demonstrated for sodium-base lubricants.

TABLE 3—EFFECT OF MINERAL OIL VISCOSITY ON WATER RESISTANCE OF GREASES

Sodium stearate soap content: 13-15 per cent

Approx. unworked and worked penetrations at 77° F.: 250

Approx. Saybolt viscosity of Mid-Continent mineral oil at 100° F., secs.	AN-G-5a procedure grease loss (%)	Navy water absorption procedure water absorbed (%)
100	25	35
1,000	20	40
3,000	8	100

The results of washout tests in Table 3 show that the tendency of sodium-base greases to emulsify to form oil-in-water dispersions decreases as the viscosities of the mineral oils they contain increase. The water absorption results indicate that the quantities of water retained in the products increase as the viscosities of the mineral oils increase. There is good reason to believe that the water-resistance properties are also affected by the degree of treating which the mineral oils have undergone. Refining of the oils results in removal of various natural components and their differences in this instance may be attributed to changes in chemical composition.

Interpretation of Results

It may be of interest to offer a few comments regarding the interpretation of the results obtained by the Navy water-absorption method. The per cent water absorbed does not reliably indicate the extent to which the consistency of the grease has changed. Attempts* to correlate changes in worked penetrations with variations in amounts of water retained in the grease have not been particularly successful, because the changes in consistency during the test are due to the severe working to which the sample is subjected by the stirring device as well as to the effect of the water on the structure of the soap. Furthermore, the characteristics of the emulsions may vary considerably during the test as the rate of dispersion of the water is varied, particularly at the beginning of the run. As a rather unusual example, mention may be made of the test on a wheel-bearing grease containing a mixture of sodium stearate and tallow soaps. The consistency of the emulsion dropped while 80 per cent of water was dispersed in the sample and then a recovery of body occurred until about 200 per cent of water had been added. Expressed in terms of micro penetrations obtained with a Texaco-type penetrometer, this grease changed from an original of 58 to 346 at 20 per cent water absorbed to 197 after about 200 per cent water had been worked into the product. To further show the erratic behavior possible in this respect, a parallel test was run with the sample maintained in a flooded condition instead of adding the water in small increments. The sample then broke down to a creamy paste, too thin to check with a penetrometer.

Microexaminations of the soap structures of the greases before and after water has been dispersed therein often reveal interesting data. For example, the inspection of a sponge grease made with soda tallow soap will disclose a tough, coarse, long-fibered structure. After water is added and emulsification has occurred, microexaminations will show a change to a comparatively fine structure with the soap fibers quite short and thin. Similar slides prepared for lithium soap greases will show at 100 magnification, little apparent change in shape of the soap fibers but will disclose a more complete dispersion.

The formation of emulsions of both types, i.e., oil-in-water and water-in-oil, and possibly compound emulsions, is of primary importance in determining the effect of additions of water. The amount of free alkali or free fatty acid present in the grease is therefore a factor as it may play a part in determining the adjustment of the stability of the emulsion. Rust inhibitors, such as emulsifiers and lead soaps, likewise affect ease of emulsification.

Under service conditions, the ability of the grease to stay put when the bearings are operated in contact with large amounts of water, is determined to an important extent by the design of the equipment. A well-known example is car and truck wheel bearings where sodium-base greases are normally employed without complaints from washout although the vehicles are used during rain and snow storms. Frequency of application is an important factor, particularly when grease must be water repellent and function as a seal for the bearing and when a balance between maintenance of lubrication and rust prevention is dependent on adding new grease to make up for that washed out.

Protection from Rusting

The seven factors listed above as determining the ability of a grease to resist washout from the bearings also affect its ability to protect the bearings from rusting when they are exposed to contact with water including condensation from humid atmospheres. However, experience has shown that if the grease is to satisfy both objectives, some compromise may be necessary because improved rust-protective properties are usually obtained by favoring the factors which tend to encourage emulsification of the dispersed water. For example, it is well known that the incorporation of a sodium soap may appreciably improve the corrosion-prevention properties of conventional calcium-base greases. It has been generally observed that the lubricant to be an effective rust preventive must contain a component which will preferentially wet the bearing surfaces in the presence of moisture and/or promote the formation of the required type of emulsion. On the other hand, if emulsification proceeds too rapidly to the point where the grease is not sufficiently retained in the bearings to provide adequate lubrication, then that grease is of questionable prac-

*Coordinating Research Council Report Project No. CLLG-13-43, "Water Resistance of Lubricating Greases."

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tical value for the application involved.

Evaluation of the rust-protective properties of lubricating greases has generally followed the line of attack used for straight rust preventive compounds. I. A. Levin* has proposed a method wherein metal balls are coated as prescribed with films of grease samples and the "porosity" of coatings, submerged in a 0.001 per cent NaCl solution, is determined by measuring the current conducted through the films. The minimum thickness of grease film required to assure freedom from "pores" is determined from curves. It is probable that during the past few years the method described in Navy Ordnance Specification OS 1350 and Army Specification AXS-781, Revision 3, has received the most widespread attention. In this test, carefully prepared steel panels are given a coating of grease and exposed in a cabinet for 100 hours to a controlled spray of 4 per cent synthetic sea water solution at a temperature of 90°-100° F. Greases are rejected if there is any evidence of corrosion of the metal when cleaned at the end of the test. It is important to note that the film of grease on the panels is extremely thin in this test. In fact, it is intended that the amount of coating be equivalent to that which would be formed by a medium-viscosity oil after a lengthy drain period.

TABLE 4—OS-1350 SALT SPRAY TEST, 4 PER CENT SYNTHETIC SEA WATER

Grease soap base—	Type product	Hrs. until failure
Calcium tallow	Army 2-107	<4
Sodium tallow	Army 2-107	<4
Aluminum stearate	Army 2-107	<4
Lithium stearate ..	AN-G-3a	<4
Lithium stearate plus rust inhibitors ...	O.D. No. 00	>150

Data covered in Table 4 indicate the degree of improvement in rust-preventive properties that can be attained by the use of properly selected additives when the products are evaluated by the above outlined procedure.

Resistance to corrosion from sea water is an important requirement, particularly for marine applications. However, experience has shown that the factor of safety potentially available with a rust-inhibited grease may also be secured by the use of other more conventional greases when they are properly applied and thicker films are maintained.

Attention has been given to the adaptation of humidity cabinets for evaluation of rust-protective properties of greases. Table 5 covers the results of tests wherein open 204 ball bearings packed two-thirds full with the grease samples were substituted for grease-coated S.A.E. 1020 panels. With the humidity maintained at the level of 100 per cent, the test

*I. A. Levin, Korroziya i Borba s Nei, 6, 3, 1940.

TABLE 5—HUMIDITY CABINET TESTS 100 PER CENT HUMIDITY AT 120° F. NO. 204 BALL BEARING PACKED TWO-THIRDS FULL

Grease soap base—	Type product	Condition of bearing after— 1 month	3 months	6 months
Calcium tallow	Army 2-107	Difficult to start. No visible rust.	Rough turning. No visible rust.	Rough turning. No visible rust.
Sodium tallow	Army 2-108	Rough turning. Most of grease gone. Considerable rust.	Rough turning. Grease completely gone. Considerable rust.	Rough turning. Grease completely gone. Considerable rust.
Aluminum stearate	Army 2-107	Slightly rough turning. No visible rust.	Difficult to start. No visible rust.	Difficult of start. No visible rust.
Lithium stearate ..	AN-G-3a	Slightly rough turning. No visible rust.	Difficult to start. No visible rust.	Difficult to start. No visible rust.
Lithium stearate plus rust inhibitor	O.D. No. 00	OK in all respects	OK in all respects	OK in all respects

TABLE 6—CORROSION TESTS ON REPRESENTATIVE TYPE GREASES 2 BY 3-IN. LOW-CARBON STEEL PANELS

Grease soap base—	Type product	Outdoor shed test*	Outdoor exposure test†	Humidity cabinet test‡	Sea water immersion test§
Calcium tallow	Army 2-107	OK >6 mos.	OK >6 mos.	OK >1 mo.	Failed after 21 days
Sodium tallow	Army 2-108	OK >6 mos.	Failed after 5 mos.	Failed after 1 mo.	Failed after 7 days
Aluminum stearate	Army 2-107	OK >6 mos.	OK >6 mos.	OK >1 mo.	OK >1 mo.
Lithium stearate ..	AN-G-3a	OK >6 mos.	OK >6 mos.	OK >1 mo.	Failed in 8 days

*Protected from rain and snow. †Plates mounted on panel at 40° angle facing south. No protection from rain and snow. ‡100 per cent relative humidity at 100° F. §Plates immersed in synthetic sea water.

was to a considerable extent also an evaluation of the water repellency and resistance to washout properties as well as rust-preventive characteristics. The results again indicate that the addition of a rust inhibitor to lithium stearate greases was effective. The sodium-soap grease in this case, when the bearings were not rotated except for inspection purposes, failed to protect the bearings from rusting and the lubricant was washed out to the point where considerable areas were left unprotected by even a separated oil film. The bearings packed with calcium, aluminum, and lithium soap greases were reported as showing no visible rust or, in other words, no rust that could be definitely detected without disassembling the bearings. Because the bearings were found to be rough turning, they were taken apart at the end of the tests. Close inspection of the balls and races showed corrosion had actually occurred at points of contact of the balls with the races and that this was the cause for rough turning of the bearings during the tests.

Data included in Table 6 were obtained from another series of tests wherein coated panels were subjected to the different types of exposure noted. The tests conducted outdoors were kept on the roof of a laboratory building located in an area surrounded by manufacturing plants of various types. It is interesting to note that the only failure in the outdoor series was a panel coated with an Army Specification 2-108 type wheel-bearing grease and that the failure was preceded by removal of grease by direct exposure to rain and snow. That same grease failed in the series run in the humidity cabinet because of excessive washoff. In respect to the observations based on the immersion tests in synthetic sea water, it should be mentioned that the aluminum-base grease employed contained an adhesive agent and a mineral oil having a viscosity of about 4,000 seconds at 100° F.

In conclusion, the data and comments presented herein are the basis for the statement that while resistance of greases to washout from bearings and their rust-preventive properties are interrelated, it is advisable to recognize that they represent different phases of the main subject of water-resistance properties of lubricating greases. Recommendations based solely on the ability of the lubricants to stay put in the presence of water may not provide products which will also give good protection to the bearing from rusting. The data furthermore indicate that many factors which influence these desirable properties and which complicate development of laboratory methods for their evaluation. Experience under service conditions is usually more desirable than laboratory data and, in this case, it is particulalry advisable to rely on information obtained in the field. A review of technical periodicals will disclose that there have not been many articles published on this subject. The Coordinating Research Council's report, entitled, "Amphibian Wheel-Bearing Grease (Project CL LG-37-44)," is a noteworthy example describing experience in the laboratory and field. It showed that good stay-put properties had definitely limited benefits if rusting proceeded to the point where the bearings were no longer operable.

Note: Article made available through the courtesy of National Lubricating Grease Institute.

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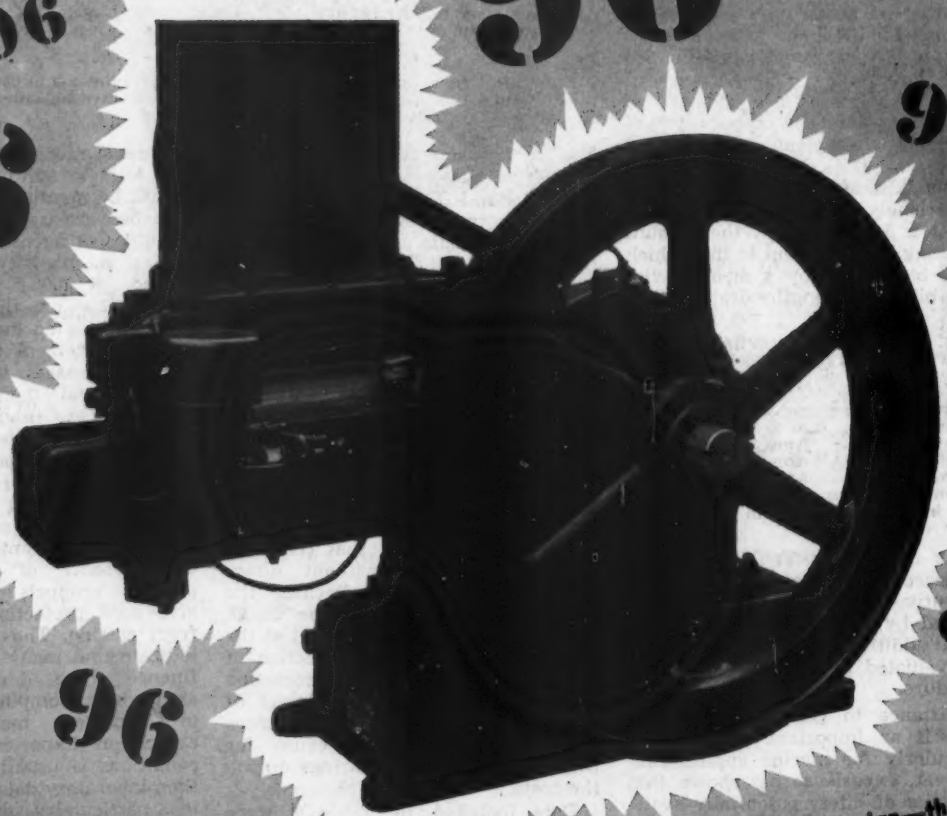

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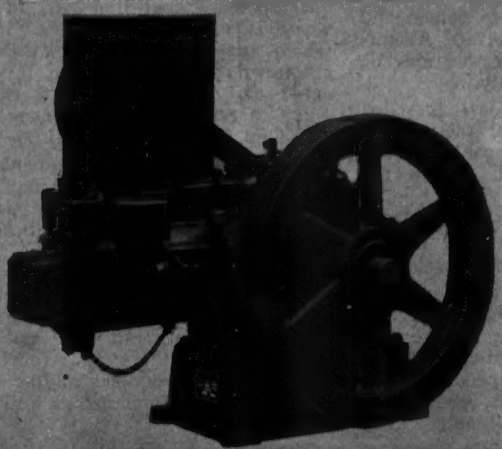
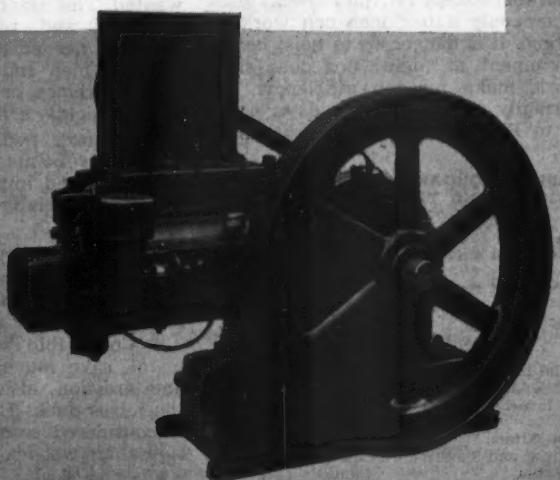


THE CSCO-66



THE CSCO-96

(The Same Engine—Only Bigger!)

CONTINENTAL

THE CONTINENTAL SUPPLY COMPANY, *General Offices:* DALLAS, TEXAS • EXPORT DIVISION: *30 Rockefeller Plaza,* NEW YORK, N. Y.
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Maintenance of Fluid Cat Cracker

(Continued from page 87)

As mentioned, the first principle governing the systematic maintenance operations on a fluid unit is that of preplanning and of providing replacement parts and all other needed equipment, men, and working tools required for the job. This system has been one of the most important factors in shortening the time of turnaround and thus of boosting the total output of the units per annum.

The general routine of preplanning and preparing for a maintenance turnaround is begun about a month before the date set for shutdown. Operations, inspection, and maintenance heads and their assistants meet with the planning group and from the reports of current operations and from records of previous turnarounds on the individual unit they make up a complete list of items for replacement, repair, and inspection. This list of jobs is given to the regional maintenance engineer who sets up therefrom a list of crafts needed and the sequence to be followed. Each job arranged for is given to the foreman for that type of work, who lays out the handling of the job, the number and type of workmen needed, material required, and the time in the sequence when the job shall be done.

It has been found that the use of shift work on turnarounds is not desirable except on "bottleneck" jobs where only a few men can work at a time. It is dangerous to hoist heavy equipment at night; nor does shift work make for top efficiency. So, normally men work only days, often 10 to 12 hours per 24-hour day, but by common agreement and with standard overtime pay, etc., for the time over 8 hours daily.

TABLE 1—ORGANIZATION OF SUPERVISORS AND TRADES GROUPS, FOR UNIT "TURNAROUND"

1. Regional engineer

2. Assistant regional engineers (4 in number)

Process: Chief and assistant	**Coordinator:** Chief.
Metal inspectors: Chief and 4 assistant inspectors	**Boilermakers:** Chief and 3 assistants
Pipe fitters: Chief and 3 assistants	**Carpenters:** Chief and 2 assistants
Welders: Chief and 4 assistants	**Riggers:** Chief and assistant
Electricians: Chief and 2 assistants	**Instruments:** Chief and assistant
Machinists: Chief	**Insulators:** Chief and assistant
Laborers: Chief and 3 assistants	**Cleaners:** Chief and assistant
Painters: Chief	**Masons:** Chief and assistant

In the specific turnaround under discussion the crafts and groups required to carry out the job are shown in Table 1. First job to be carried out before the plant is shut down is that of erecting scaffolds at all points where these are required. This scaffolding is erected before shutdown by carpenters and riggers. When shutting down, all the catalyst possible is withdrawn from the unit; steam, air, and inert gas are introduced to drive out vapors and gases from vessels and lines. As soon as possible the pipe fitters go into the plant, disconnect entrance and exit lines, and install blanks to prevent any possibility of accidents due to admission of oil, steam, or gas. The unit is then given a thorough cleaning in order to permit inspectors to swarm over the entire unit and find unforeseen and unpredicted repairs which had not been included in the plans made earlier.

Several aids are employed to speed up, simplify, and improve the job. Among these are:

1. A public-address system is installed on the job for quick and ready contact with all phases, groups, leaders, and so on. The system is set up with loud speakers installed on the superstructure at strategic points. A turnaround coordinator handles communications on all matters; finds men wanted, reports arrival of materials, calls foremen, who answer on the nearest phone to find out what is wanted. This system helps to prevent accidents and reduces perceptibly, lost time needed to go in person and hunt up men and materials. Assembly of foremen or inspectors may be called quickly, efficiently.

2. Sanitary facilities are installed at various points about the job, to save time and improve sanitary conditions, especially high up in the structures.

3. Additional manholes and platforms are installed to speed up the inspection and repair of vessels and piping.

4. Collapsible scaffolds, generally metal, save much time in assembly and erection, also in removal after the job is done. This type of scaffold is considered safer and less expensive than wooden scaffolding.

5. Each day or two, frequently at noon, foremen, supervisors, and others meet to discuss the progress of the job. At these meetings the bottleneck jobs are discussed and arrangements are completed to correlate the efforts of the various crafts. Valuable suggestions on ways of speeding up the job are frequently brought to the meeting. Periodically, over the loudspeaker, the coordinator or other higher administrative or executive official, makes a talk to the entire staff, outlining the work, showing progress, all to observe care and efficiency.

Maintenance Maps

To expedite further the turnaround, a large map of the catalytic cracking unit is prepared, with the location of each job on the official work list indicated by the same number as the number of the job shown on that list. A second map is prepared, which shows the items for preparation for inspections indicated and identified by the same numbers as these operations are numbered on the vessel-inspection sheet, the expansion-joint data sheet, etc., and with various indications, by cross hatching, chains, and other devices, to show what preparations are to be made such as installing chain ladders, scaffolds, inspection and cleaning openings, and other important information. Such map arrangements may be developed for any installation, and would differ in many details, although probably following the same plan and principles as the one mentioned.

In addition, a large map is made of the entire unit, and fastened to the wall of the control house or at whatever point the turnaround coordinator's headquarters will be, with each of the multitudinous jobs marked thereon, in plain view for everyone to see. When scaffolding or ladders, or whatever equipment is needed initially is in, the individual job area is colored an identifying color, each in turn. As the work progresses, other colors are painted in, to show the status. When each job is completed, it is given a color, or "painted out" to show that that part of the work is entirely completed. Items which appear to be lagging behind, as shown by the map, are investigated and if necessary, efforts are made to remove the bottleneck and speed up the work.

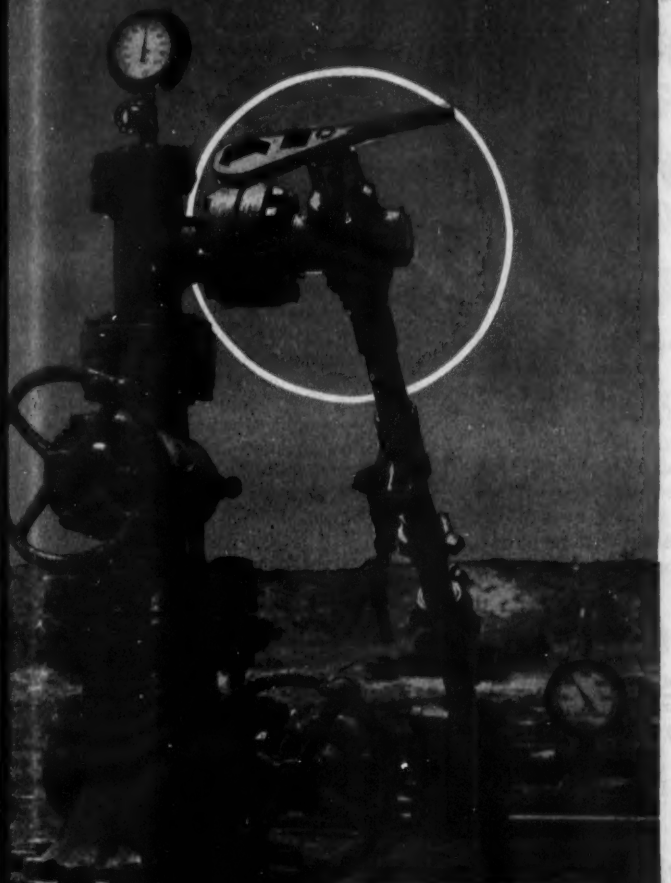
Numerous items of equipment are employed as part of the turnaround operation, such as two trucks assigned to that work, for rapid handling of any material required. Also two cranes are assigned to the job for the same purpose. Straddle trucks are assigned and kept on the job continuously, to transport material and to speed up the work. A portable power saw for wood scaffolding, was used, it speeds up scaffold building greatly.

The working principle in all these operations is to raise the service factor on the unit; that is, the ratio between the total time elapsed during a given calendar period and the total time during which actual operation was under way. A 90 per cent service factor is considered average. This factor is determined by the length of time on stream and the subsequent turnaround period. In shortening the turnaround, emphasis is placed on eliminating bottlenecks in repairs, and correcting or eliminat-

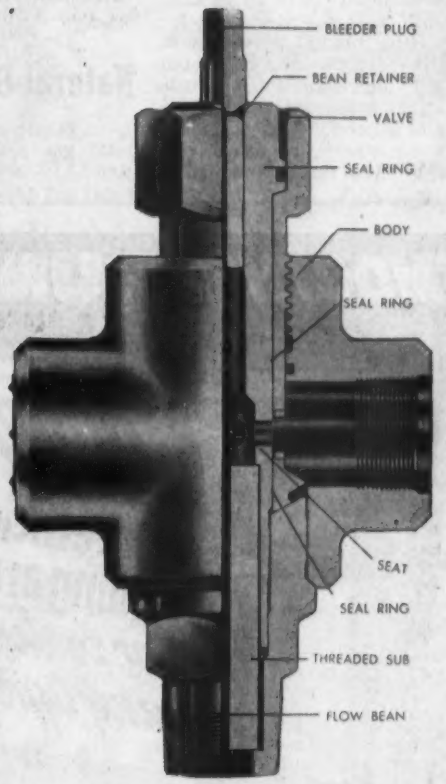
THE NEW *Cameron* TRIPLEX FLOW WING

TRIPLEX

1. Wing Valve
2. Removable Positive Choke
3. Interchangeable Adjustable Choke



A Cameron Type "F" Flow Wing on a 6000-lb. test Xmas tree assembled on Cameron Type "F" Forged Steel Casing and Tubing Heads.



This latest model Cameron Christmas tree Flow-Wing serves a triple purpose: Within its overall length of *less than 16 inches* are combined all the units required to make up a flow-wing—a shut-off valve, positive choke, or adjustable choke.

Note in the accompanying cross-sectoin view that essentially the same valve principle is used as in the earlier and higher pressure models. The stellite seat has proved highly satisfactory for withstanding abrasive flow and provides a dependable shut-off for choke changing. The valve is opened and closed by means of an all-purpose wrench (see picture at left).

The Flow-Wing may be fitted with a positive flow bean as illustrated, or with an adjustable choke, the latter interchanging with the pressure relief plug and bean. The all-purpose wrench is the only tool required for this operation.

To change positive beans you simply fit the wrench to the valve stem and close the valve, back out the bean retainer with the same wrench (the bean is retrieved with the retainer), replace the bean and reverse these operations. As a safety measure, the bean and its retainer cannot be removed until the valve is closed.

Complete details will gladly be sent to interested operators on request.

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ing those items which slow down repair work. For longer runs it is important to overcome mechanical problems such as slide valve erosions which cause shutdowns.

Much more might be said about the morale and willingness to work of the turnaround staff. Presented at the outset was the necessity for turning out the maximum amount of products to meet the unprecedented demand for and shortage of fuels and lubricants the country over, and the desire of all concerned to get the unit back on stream to effect this result and to show the most efficient job yet accomplished in a fluid turnaround. The unit was "flanged up" finally about 2:30 a.m., the workers and supervisory staff went to bed, the latter back on the job at 8:00 a.m. to see if the high-speed job was working properly—it was. The former turnaround record had been reduced by one-third.

Natural-Gas Reserves

(Continued from page 89)

total gas reserve remaining at any time.

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Larger
more efficient
sealing area—
for sealing in
any type pipe
ONLY AMERICAN gives you the exclusive feature of a cup packing element which is expanded laterally . . . not compressed! And since all the seal is accomplished in one cup . . . there is no additional possible point of leakage! This fact, plus the larger sealing area of this packing element, also greatly overcomes interference from foreign matter such as steel cuttings or cement accumulations.
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Estimating Dissolved Gas Reserves

The principal method of estimating dissolved gas reserves is a volumetric method. The original gas in place is determined by estimating the original volume of stock tank oil in place, and multiplying this value by the original solution gas-oil ratio. The recovery factor to be applied depends on the mechanics under which the reservoir will be produced.

1. Water drive.—In the case of reservoirs in which the pressure does not drop below the bubble point, the gas-oil ratio will be constant and the recovery factor for gas will be the same as the recovery factor for oil. East Texas field is an example of this type of reservoir.

In the case of reservoirs in which the pressure drops below the bubble point, the recovery factor for gas will be greater than the recovery factor for oil. In order to make an accurate determination of the recovery factor, it is necessary to predetermine the pressure history of the field by material balance and water influx calculations, or by extrapolating a curve of pressure against cumulative production, if rates of production have been constant. Having estimated the pressure history of the field the amount of gas to be recovered can be reasonably approximated by multiplying the volume of recoverable oil by the original dissolved gas-oil ratio and adding an amount equal to the volume of unrecoverable oil times the difference in the original dissolved gas-oil ratio and the amount of gas in solution per barrel of oil at the average pressure at which the reservoir is expected to be produced.

2. Constant-volume-type reservoir. To calculate the amount of recoverable gas it is necessary to calculate the gas originally in place and subtract the gas that is calculated to be unrecoverable at the expected abandonment pressure of the reservoir. This may be calculated by the following equations:

$$R = O_p G_o - U$$

where

R = recoverable gas in cu. ft.

U = unrecoverable gas in cu. ft. or $(V - O_u Fv_a)\ 5.61 \dfrac{P_a}{P_b} \dfrac{520}{t+460} \dfrac{1}{Z_a} + O_u G_a$

V = void space in reservoir in bbl., or $7{,}758 \times \phi \times (1 - S_w)$

O_u = unrecoverable oil in bbl. at stock-tank conditions or $(O_p - O_r)$

O_p = original oil in place in bbl. at stock-tank conditions, or V/Fv_o

O_r = recoverable oil in bbl. at stock-tank conditions

Fv_o = original formation volume factor

P_a = reservoir pressure at abandonment in psia.

P_b = base pressure in psia.

t = reservoir temperature in °F.

Z_a = compressibility factor at P_a

G_a = cu. ft. of gas at base pressure in solution per bbl. of stock-tank oil at P_a

G_o = cu. ft. of gas at base pressure originally in solution per bbl. of oil at stock-tank conditions

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CLOSE DIFFERENTIAL
PRESSURE CONTROL

TYPE EJO
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TYPE EGL PRESSURE SWITCH

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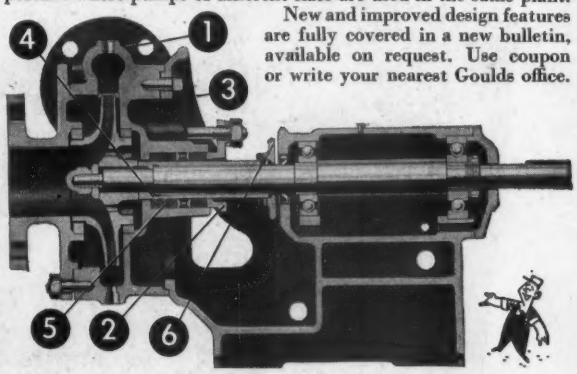
THE "SUPPORT-HEAD"

26 SIZES • CAPACITIES UP TO 3000 GPM, HEADS UP TO 400 FT. *depending upon capacity*

LIKE the new "Close-Cupld" announced recently, Goulds new series of ball-bearing "Support-Head" Centrifugal Pumps embody features which enhance pumping efficiency, simplify maintenance and prolong the life of each unit.

Extra-heavy, well-proportioned construction throughout (see cross section) assures trouble-free operation 24 hours per day under the most severe service conditions. And like the "Close-Cupld," wearing parts also have been standardized for the "Support-Head" to fit pumps of different sizes. This reduces spares to a minimum, important where pumps of different sizes are used in the same plant.

New and improved design features are fully covered in a new bulletin, available on request. Use coupon or write your nearest Goulds office.



Important New Features of Gould's "Support-Head" Pump

1. Volute type casing is bolted to support head with *recessed lock fit* to assure alignment. No stud or bolt holes are tapped through casing to liquid ways.

2. A new split gland makes it unnecessary to unbolt gland halves when repacking stuffing box—saves time.

3. Full, open-top construction permits ready access to gland and stuffing box, important where pump is located in an inaccessible position.

4. Shaft sleeve covers full length of shaft, completely protects shaft from liquid damage. Shaft sleeve is free to expand or contract with temperature changes to prevent buckling and distortion.

5. Stuffing box is regularly provided with die-formed, semi-metallic packing. A mechanical seal may be substituted where preferred (without necessity of any remachining of stuffing box) . . . gives you operating flexibility.

6. Liquid deflector prevents leakage of liquid into motor bearing and is drilled and tapped so that in servicing pump it can be used to prevent shaft rotation while removing or tightening impeller nut; also to remove sleeve . . . a time saver.

GET THE FACTS ABOUT GOULDS NEW "SUPPORT-HEAD"!

Your copy of Bulletin 715.1 is ready. It contains full specifications, materials of construction with A.S.T.M. designations, complete characteristic curves with efficiencies and horsepower ratings of *each* pump and all dimensional data to make a layout.

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GOULDS PUMPS, INC.

SENECA FALLS, N. Y.

the PUMP FOR the JOB

New Invisible Eyes

(Continued from page 101)

detector bolted to a manhole plate on the outside of the unit. The detector was connected electrically to a recording pneumatic controller which was tied into the same diaphragm control valve used in the mechanical float system.

The center line of the radium scurce and detector is at the level desired to be maintained in the depropanizer. Any rise in the level of the sludge past this point reduces the number of gamma rays which penetrafe to the detector. This reduction is transmitted electrically to the controller which pneumatically through the motor diaphragm valve increases the supply of steam to the discharge pump. The speeding up of the discharge pump brings the sludge level back to normal. In the same manner, any reduction in the level of the sludge below the set point reduces the supply of steam to the discharge pump, slowing it down and permitting the sludge level to rise. Thus a predetermined level is automatically maintained in the depropanizer.

Wash-Tank Installation

The second Gagetron installation was made for alarm purposes, as contrasted with the depropanizer installation which was to provide liquid-level control. It is highly important in the distillation process, of course, that no water carry over from the wash tanks to the furnaces. An instant explosion would almost surely result, endangering the entire refinery. For this reason, the plant operators decided to install a Gagetron as an added safety feature supplementing the mechanical float in use on the wash tank. The sole purpose of the instrument is to supply a warning any time the salt water in tank passes a prescribed danger point.

As was the case for the sludge depropanizer, the radium source of the Gagetron was permanently mounted inside the tank and the detector directly opposite it at a predetermined level on the tank's exterior. As long as crude is between the radium source and the detector unit it will indicate a certain reading. Any time salt water replaces the crude a lower reading will result because of the high absorption of gamma rays by salt water as compared to crude.

The detector unit is wired to a light and a bell in the instrument house adjacent to the wash tank. Any time salt water reaches the danger point in the tank the light goes out and the bell starts ringing. This alerts the plant operator and he can draw down the salt water to a safe level.

Alternate Gagetron Installations

The two installations which have been described have been for the purpose of maintaining a constant liquid level, and providing an alarm. Hence, no emphasis has been placed on the possibilities of the Gagetron for recording a variable liquid level. Two types of installations have been designed for this purpose. Both of these utilize a corrosion-resistant float containing the gamma ray source. In the first type a perforated pipe is extended the height of the vessel being measured and the metal float is contained within it (see Fig. 1). This type of installation is designed for a situation where for some reason or another there is not access to the bottom of the vessel. It is necessary only to cut a hole in the top of the vessel, insert the perforated pipe until it touches bottom, and weld the top end of the pipe to the vessel. The detector unit is mounted on the top of the unit directly above the float and connected electrically to a recording controller. The lower the float goes in the vessel, the fewer gamma rays reach the detector, and consequently the lower its reading. The readings on the detector can be converted into distance and thus a continuous record kept on the controller of the liquid level within the vessel.

The second type of installation is designed for situations where access can be had to the bottom of the vessel. Guides of an appropriate metal (depending upon the liquid being contained in the tank) are fastened to the bottom and top of the

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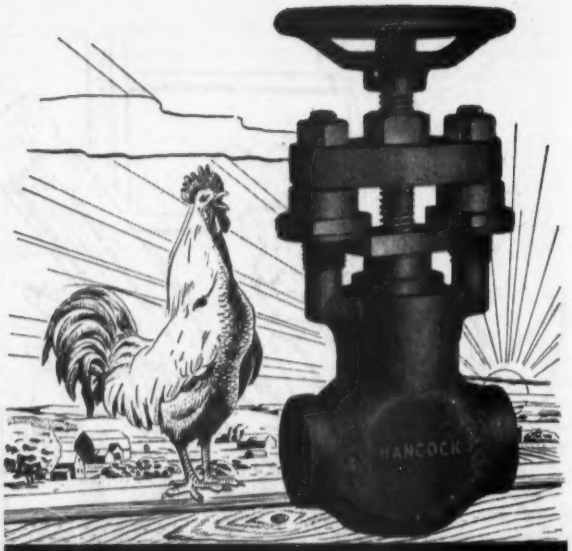

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vessel to keep the float directly under the detector unit (see Fig. 1).

Details of Gagetron Operation

The operation of the gamma ray detector and source which comprise the Gagetron can be described in more detail by the following: As previously mentioned, the detector is placed on the exterior of the containing vessel, and the source, an iridium-platinum needle containing a minute quantity of a commercially available radium salt is placed inside. As the gamma ray absorption factor of the vessel wall directly below the detector is a constant, and as the absorption factor of the gas, air, or vapor above the liqiud is negligible, the amount of detected gamma radiation is inversely proportional to the square of the distance between the gamma ray source and the detector. The gamma rays, upon striking the detector (a counter of the Geiger-Mueller type), set up minute pulses; the rate of generation of these electrical pulses is the indication of distance between the source and counter, hence the liquid level.

These minute electrical pulses are greatly amplified, integrated, and rectified to produce a d.c. current, the value of which is proportional to the number of detected gamma rays per unit time. Since this d.c. current is inversely proportional to the square of the distance between the source and the detector, the measured level at the extremes would be difficult to read. To overcome this difficulty, a feed-back circuit has been added to produce a d.c. value that approaches a linear relationship to the distance between the source and detector. Thus the measured value of the resultant d.c. current can then readily be converted into height of the liquid level expressed as feet and inches.

Incorporated in the instrument is an a.c. power supply which rectifies and supplies the d.c. voltages necessary for the electronic circuit. The unit is designed for operation on 90-110 volt, 50-60 cycle, a.c. power source, and the power consumption is approximately 75 watts. Development of the new gamma ray control device has been by Engineering Laboratories, Inc., Tulsa.

Hydraulic Pumpers For Shallow Wells

(Continued from page 105)

ciprocating hydraulic cylinders with the exception of the means used to reverse the master valve. In other mechanisms this is sometimes done mechanically through linkage and levers, and sometimes hydraulically, using a pilot valve as in this case. In those mechanisms where it is done hydraulically, the reversals are effected in various manners such as opening one end of the pilot valve to exhaust pressures or spring loading it on one direction using intake pressure to depress the spring. In the case of the Hyd pumper, however, we found that by pressurizing or actually superpressurizing one end and venting the other, it gave us the positive action and dependability required, and was effected with no more moving parts.

Fig. 1 shows the flow diagram of the Hyd pumper in one position of its cycle. It shows the main piston approaching the end of its travel towards the right with the small pilot-valve piston at the top and also at the right-hand position. The pressured oil can be traced from the intake through the pilot valve, to the left hand end of the large master valve below it, holding the master valve in its right hand position. This allows the pressure oil to flow through the master valve to the main cylinder, forcing it to the right. When the main piston reaches the end of the main cylinder it depresses the small inserted piston in the cylinder head. This small inserted piston pressurizes the oil trapped behind it and forces it into the right hand end of the pilot-valve piston. At the time it opens the left hand end of the pilot-valve piston to exhaust by means of

CROSS-SECTIONAL VIEW OF "UNIT LOADING" METHOD

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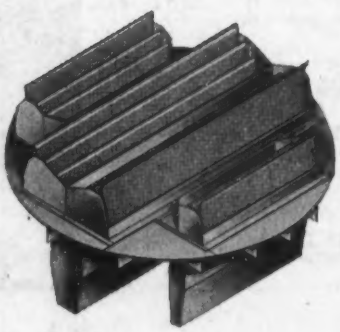

U.S. PATENT NO. 2,491,569
TRADEMARK REGISTERED

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a small land in the small inserted piston, which opens an orifice as it is forced back by the main piston.

These reversals of pressure on the ends of the pilot piston cause it to move to the left, which movement in turn lines up the center ports in such a manner as to allow the pressure oil from the intake to the right hand end of the master valve, and at the same time opening the left hand end of the master valve to the exhaust. This causes the master valve to move to the left.

Smooth, Gradual Reversals

As the master valve moves to the left, in turn the flow of the main oil streams is redirected to the alternate ends of the main piston, causing it to travel to the left. This action is all repeated in reverse at the other end of the cylinder. The two rods extending to the outside from each end of the pilot valve are simply manual means of reversing the pumper in mid-stroke. This device enables the operator to pick up his wells.

Perhaps the most difficult problem encountered in the design of the Hyd pumper was the problem of smooth, gradual reversals. There are several means of accomplishing this. It can be done by controlling the rate at which the master valve spool travels when reversals occur. This can be done by installing a check and needle valve in the fluid passage to each end of the valve, allowing free flow in and metered or restricted flow out. This is illustrated in Fig. 1. It can also be done by allowing what is called an "open center" effect in the master valve spool. This is illustrated in Fig. 2. The valve is shown in mid position, at which point the pressured oil is flowing in both directions, which gives the cushion effect sought to the travel of the main piston. A third means of obtaining smooth reversals is to cause the main piston to overtravel the exhaust port, thus entering the end of the cylinder where the oil thus trapped is allowed to escape through a highly restricted but adjustable needle valve. All three of these methods are used in the Hyd pumper, enabling obtainment of any degree of smoothness desired on the reversals. An interesting side light to this question is that one operator insisted on sharp, jerky reversals of the rod line, explaining that such action kept his valves in the bottom-hole pump free, thus saving him considerable work each day.

BOOKS

ENGINEERING DATA BOOK. By Arthur G. Vogel. Published by Rempe Co., 340 North Sacramento Boulevard, Chicago. 34 pp. $1.50.

This booklet was prepared for the engineer and draftsman as a guide in the design of pipe coils and fin coils, with specific data on the subjects of dimensional limitations, coil development formula, and heat-transfer factors.

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ENGINEERING fundamentals

No. 305

Reservoir Volumes— Barrels of Free-Gas Space

THE gas law, $PV = ZnRT$, is used to convert volumes of gas at one pressure and temperature to other pressures and temperatures. In particular, gas removed from a reservoir, measured at some base temperature and pressure, can be converted to an equivalent volume representing the space that this produced gas would occupy in the reservoir, assuming that it remained in the gaseous state.

To convert 1 standard cubic foot of gas to the volume it would occupy as free gas in the reservoir, proceed as follows:

$$\frac{P_1V_1}{Z_1T_1} = \frac{P_2V_2}{Z_2T_2} \qquad (1)$$

or if standard conditions are 14.7 psia. and 520° R. (at which conditions Z is 1.0), then for 1 standard cubic foot,

$$\frac{14.7}{520} = \frac{PV}{ZT_r} \qquad (2)$$

where V is the equivalent cubic feet of free gas in the reservoir at P and T_r.

It is frequently desirable to know this gas volume in barrels rather than in cubic feet. If **v** designates the barrels of free gas space occupied in the reservoir by 1 standard cubic foot of gas compressed to reservoir conditions, then from Equation 2:

$$v = \frac{14.7}{520} \cdot \frac{T_r}{5.62} \cdot \frac{Z}{P} \qquad (3)$$

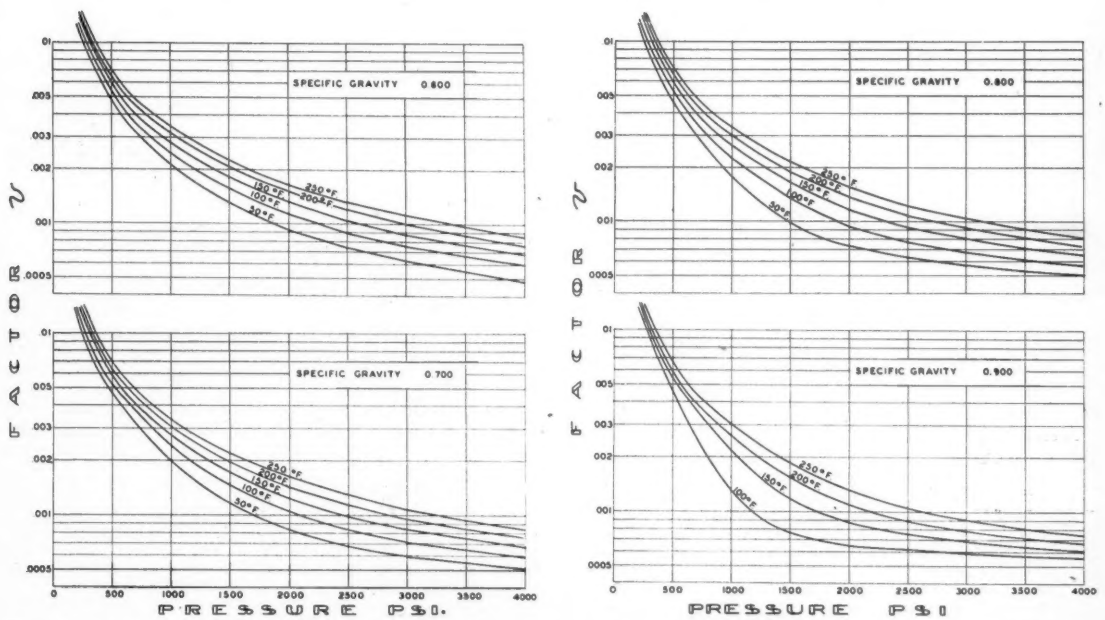
since there are 5.62 cu. ft. per barrel.

This relationship has been used to prepare the accompanying charts from which may be read the quantity **v** at various temperatures and pressures for gases of varying specific gravity. These were prepared by estimating pseudocritical temperature and pseudocritical pressure from the gas gravity by use of the charts in Engineering Fundamentals No. 303, and using these values to get Z factors from the charts in Engineering Fundamentals No. 302. The use of the accompanying graphs is self evident.

Example.—A gas has a gravity of .675. How much space would be occupied by this gas in a reservoir at 170° F. and 2,000 psia.?

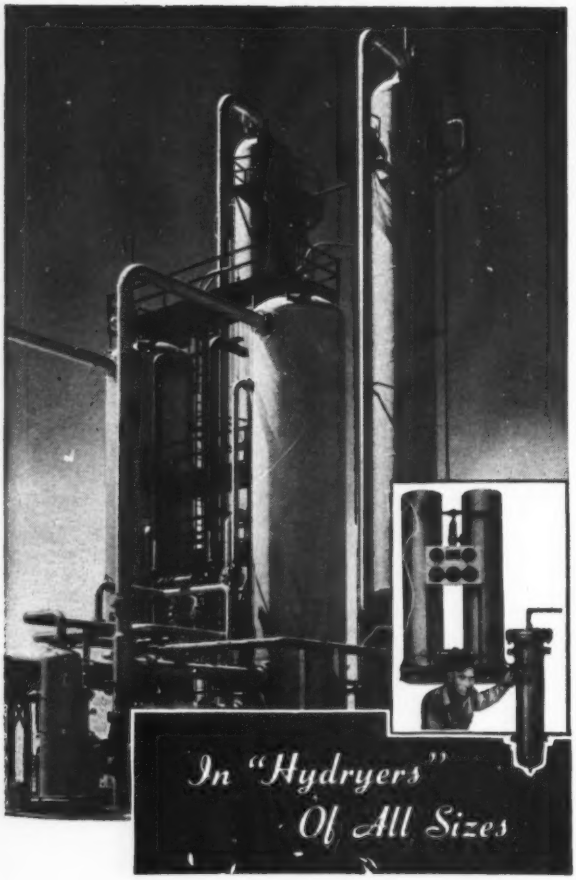
Solution.—Use charts for Sp. Gr. = .600 and Sp. Gr. = .700 and interpolate. For Sp. Gr. = .600, v = .00145. For Sp. Gr. = .700, v = .00137. By a direct ratio, .075/.100 (.00145 — .00137) = .00006.

Therefore, at Sp. Gr. = .675 the value of v is .00139, which is the number of barrels of free gas space occupied at 170° F. and 2,000 psia. by 1 standard cubic foot of gas.



These four charts give the "v" factor—or barrels of free gas space—occupied in the reservoir by one standard cubic foot of gas, for various stipulated pressures, temperatures, and specific gravities of the gas

Series prepared by Dr. John C. Calhoun, Jr., Petroleum Engineering School, University of Oklahoma



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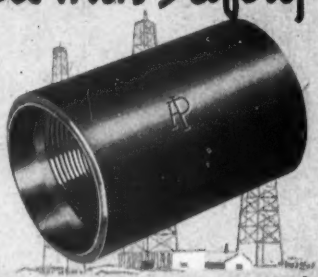

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Circulating System

PRESENT-DAY drilling conditions impose severe requirements on the circulating system of the rig. As the depth of the wells drilled increases, the circulating pressures increase. Large circulating rates are required if satisfactory rates of penetration are to be maintained. The importance of these requirements to the over-all operation of the rig is apparent, if the fact is considered that from 70 to 85 per cent of the horsepower hours needed for the drilling of a well is used in circulation of the drilling fluid.[1] Because of these facts much work has been done in the last few years on the practical aspects of the problems of hydraulics of the circulating system.

The elements of the system to be considered are: surface lines, stand pipe, hose, kelly, drill pipe, bit, and the annular space between the drill pipe and the hole. In the considerations which follow it is assumed that the correct bit is being used for the formation drilled and bit pressure losses are estimated.

Factors Involved

For a given set of conditions, such as available pump, depth of drilling, and others, the design of the circulating system includes selection of surface lines, drill pipe, and the annular space between drill pipe and hole. The interrelated factors which enter into consideration are volume of mud pumped through the system per unit of time (that is the rate of circulation), the velocities, and the back pressure put on the pump by the system.

The rate of required circulation is governed by size and type of bit used, type of formation drilled, speed of rotation, and weight on bit. The velocities are a function of the cross-sectional areas of the system and the rate of circulation. The back pressure on the pump depends on rate of circulation, characteristics of the drilling fluid, depth of drilling, and the design of different elements of the system.

For a number of years a trend was evident to reduce all the restrictions in the path of the fluid pumped through the circulating system. This trend resulted in replacement of standard tool joints with full-hole and internal-flush joints and in enlarging and streamlining the surface lines. As the depth of the wells drilled continued to increase, however, these steps alone were not sufficient to maintain the pumping efficiency and reduce excessive circulating pressures. This is particularly true in view of the characteristics of some of the muds which have to be used in present deep-well drilling. Chart in Fig. 42 shows increases in pressures for a given size drill pipe and for given rates of circulation with increase in depth and in density of mud used.[2]

More recently, use of larger-size drill pipe has been resorted to in order to meet these conditions. This practice has several beneficial effects on the operation of the circulating system and of the rig as a whole. Before discussing these effects, velocities, pressures, power requirements and efficiencies of the circulating system will be considered.

Drill-Pipe Velocities

Chart in Fig. 43 shows approximate velocities of mud in drill pipe of different sizes for different rates of circulation.[3]

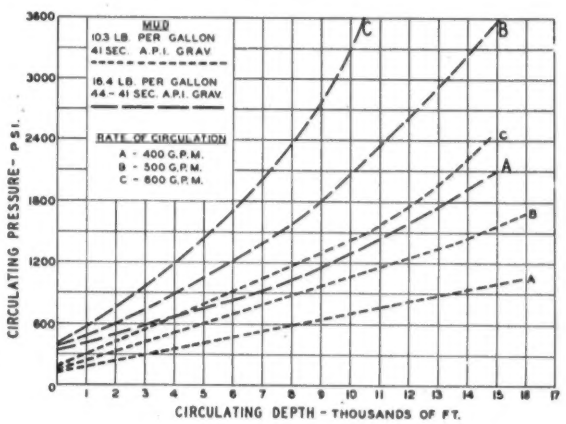
The lower limit of velocity of mud in drill pipe is pretty well determined by size of pipe and circulation rates commonly used. The upper limit should be considered from the point of view of pressures created and power required for pumping. It has been suggested that velocities of from 8-11 ft. per second work out satisfactorily.[3]

References

1. W. S. Crake: "Modern Rotary Drilling Machinery and Practices," The Oil and Gas Journal, July 21, 1945.
2. Chart based on data from an article by E. H. Short, Jr.: "Larger Drill-Pipe Results in Greater Speed in Drilling Gulf Coast Wells," The Oil and Gas Journal, February 22, 1947.
3. Chart from Reference 1.

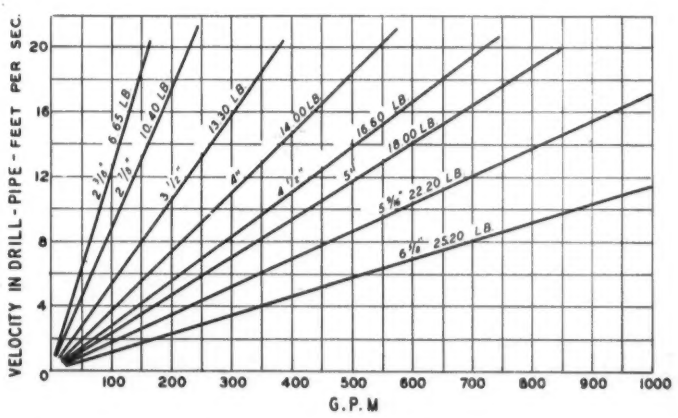
(Right)

Fig. 42 — Circulating pressures for two types of mud, for different depths and different rates of circulation— 4½ o.d. E.U.I.F. drill pipe


MUD
10.3 LB. PER GALLON
41 SEC. A.P.I. GRAV.
16.4 LB. PER GALLON
44 - 41 SEC. A.P.I. GRAV.
RATE OF CIRCULATION
A - 400 G.P.M.
B - 500 G.P.M.
C - 600 G.P.M.
CIRCULATING PRESSURE - P.S.I.
CIRCULATING DEPTH - THOUSANDS OF FT.

(Below)

Fig. 43 — Velocity inside of drill pipe for different sizes of pipe and different rates of circulation



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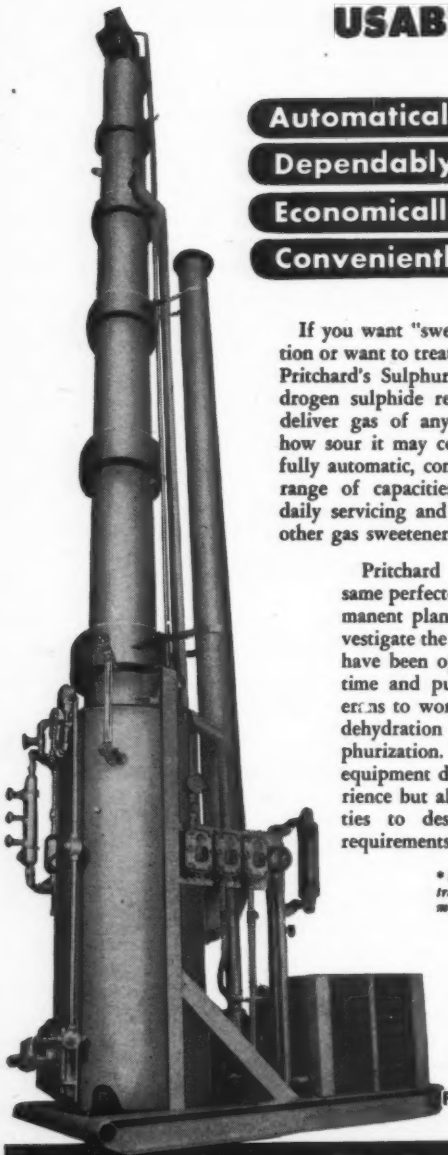

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The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Viscosity and Centrifugal Pumps

TENTATIVE SCHEDULE OF TOPICS

No. 166—October 18—Sizing of Refinery Lines
No. 167—October 25—Viscosity and Centrifugal Pumps
No. 168—November 1—Pipe and Tubing (up to 2 in.)
No. 169—November 8—Pipe and Tubing (2-4 in.)
No. 170—November 15—Pipe and Tubing (4½-5¼ in.)

VISCOSITY does not alter materially the behavior of reciprocating or rotary pumps except that more power is required when handling viscous oils. With centrifugal pumps, however, viscosity is vital because it alters the position of the head capacity and other characteristic curves (The Refiner's Notebook No. 149, June 21, 1947, page 115; and No. 150, June 28, 1947, page 149) of the pump.

The effect of viscosity on centrifugal-pump behavior is not entirely known, but A. J. Stepanoff, in "Pumping Viscous Oils with Centrifugal Pumps," The Oil and Gas Journal, May 9, 1940, page 78, has developed a theory and presents curves by which the head, capacity, and power at the single point of maximum efficiency can be determined for each viscosity of material that the pump may handle. The characteristics of the pump at the point of maximum efficiency when handling viscous oils are stated in Tables 1, 2, 3, and 4 on the back of this page, as percentages of the characteristics of the pump (at maximum efficiency) when handling water. Thus, the tables and method presented here require that the regular curves for the pump (supplied by manufacturer) when handling water, be available. The point of maximum efficiency of the pump is a major variable and hence Tables 1, 2, 3, and 4 are for maximum efficiencies of 60, 70, 80, and 90 per cent. The general shape of the entire head-capacity curve and the horsepower curve can be estimated by the method outlined in the example which follows and by reference to Fig. 1.

Example.—A centrifugal pump when handling water exhibits the characteristic curves shown by the solid lines of Fig. 1. The approximate behavior of the pump when handling an oil of 2,000 seconds Saybolt Universal viscosity and 0.9 specific gravity is shown as dotted lines. The dotted lines (new behavior) were obtained as follows:

When handling water (see Fig. 1) the peak efficiency is 80 per cent, the capacity is 500 g.p.m. and the head is 180 ft. Table 3 (80 per cent maximum efficiency) shows that the pump when handling a 2,000-viscosity oil produces only 84 per cent as much capacity and only 84 per cent as much head as when handling water. Thus, under the new conditions:

Capacity $500 \times 0.84 = 420$ g.p.m.
Head ... $180 \times 0.84 = 151$ ft.

This point is circled on the dotted line of Fig. 1, and it is the only point on the dotted line that can be accurately located.

The horsepower point can be located by noting that the power at maximum efficiency (80 per cent for water) is 28.4 hp. Referring to the last column of Table 3, the power required for the 0.9-specific gravity viscous oil, is:

$$28.4 \times 1.15 \times 0.9 = 29.4 \text{ hp.}$$

This is plotted (circled) at 420 g.p.m., the point of maximum efficiency for the oil.

The new horsepower curve is parallel (or exhibits parallelism) to the power curve when handling water as shown in Fig. 1.

To estimate the new head curve, two construction lines (a and b) are drawn, each from the "shut in" head point and the point of maximum efficiency as shown in Fig. 1. Vertical offsets or deviations are measured between construction line "a" and the head curve for water. These same offsets are transferred to line "b" but they are plotted at only 84 per cent of the capacities on the water-head curve. As one example, at a capacity of 500 g.p.m. on the head curve for water the correction is about 60 ft. The 60 ft. would be plotted on the oil-head curve at 84 per cent of 600 or 504 g.p.m.

If a new efficiency curve is desired, it may be constructed by calculating several points from values on the other two curves as follows:

$$E = \frac{\text{Head} \times \text{capacity} \times g}{3{,}960 \text{ hp.}}$$

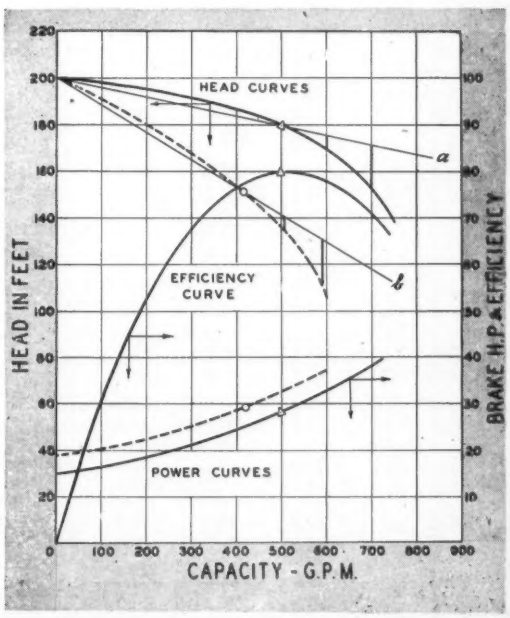


Fig. 1—Estimating behavior of centrifugal pump when handling a 2,000-viscosity oil

No. 167 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

TABLE 1—60 PER CENT MAXIMUM EFFICIENCY PUMPS

Viscosity, S.S.U. at pumping temperature	Performances as percentages of the performance with water, all at maximum efficiency			
	Capacity	Head	Efficiency	Horsepower*
50	100.0	99.5	57.5	104.0 g
80	98.5	98.5	54.0	107.8 g
100	98.0	98.0	52.0	110.8 g
150	96.0	96.0	47.5	116.3 g
200	94.0	94.0	44.5	119.1 g
300	91.0	91.0	40.0	124.2 g
400	88.0	89.0	37.0	127.0 g
500	85.0	86.0	34.0	128.0 g
600	83.0	84.5	32.5	129.5 g
700	80.5	82.5	30.5	130.0 g
800	79.0	81.0	29.0	131.0 g
900	77.0	80.0	28.0	132.0 g
1,000	75.5	78.0	26.5	133.0 g
1,500	69.0	72.5	22.0	136.5 g
2,000	63.0	67.5	19.5	131.0 g
2,500	58.0	63.0	17.0	129.0 g
3,000	54.0	59.0	15.0	127.5 g
4,000	47.0	50.5	12.0	118.7 g
5,000	41.0	45.0	10.0	111.0 g

*"g" is the specific gravity of the oil at the pumping temperature.

TABLE 2—70 PER CENT MAXIMUM EFFICIENCY PUMPS

Viscosity, S.S.U. at pumping temperature	Performances as percentages of the performance with water, all at maximum efficiency			
	Capacity	Head	Efficiency	Horsepower*
50	100.0	100.0	69.5	100.8 g
80	99.5	100.0	67.5	103.1 g
100	99.0	99.5	65.5	105.3 g
150	98.0	98.5	62.0	109.0 g
200	96.5	97.0	59.0	111.0 g
300	94.0	94.5	55.0	113.1 g
400	92.0	92.0	51.5	115.0 g
500	90.5	90.5	49.0	117.0 g
600	89.0	89.5	47.5	117.3 g
700	87.0	88.0	45.7	117.3 g
800	85.5	86.0	44.0	117.0 g
900	84.0	85.0	43.0	116.2 g
1,000	83.0	84.0	42.0	116.0 g
1,500	78.0	79.0	37.0	113.5 g
2,000	74.0	75.5	34.7	112.6 g
2,500	70.5	72.5	32.0	111.6 g
3,000	67.0	69.5	30.0	108.8 g
4,000	61.0	64.0	27.0	101.2 g
5,000	55.0	60.0	25.0	92.4 g

*"g" is the specific gravity of the oil at the pumping temperature.

TABLE 3—80 PER CENT MAXIMUM EFFICIENCY PUMPS

Viscosity, S.S.U. at pumping temperature	Performances as percentages of the performance with water, all at maximum efficiency			
	Capacity	Head	Efficiency	Horsepower*
50	100.0	100.0	80.0	100.0 g
80	100.0	100.0	79.0	101.0 g
100	100.0	100.0	78.0	102.5 g
150	100.0	99.0	76.0	104.3 g
200	99.0	99.0	74.0	106.0 g
300	98.0	98.0	70.0	109.5 g
400	97.0	96.5	67.5	111.0 g
500	96.0	95.0	65.0	112.2 g
600	94.5	94.0	63.0	112.8 g
700	93.5	93.0	61.0	113.7 g
800	92.5	92.0	59.5	114.2 g
900	91.8	91.0	58.0	115.0 g
1,000	91.0	90.5	57.0	115.5 g
1,500	87.0	87.0	52.5	115.4 g
2,000	84.0	84.0	49.0	115.0 g
2,500	81.5	82.0	46.5	114.9 g
3,000	79.0	80.0	44.0	114.8 g
4,000	73.5	76.5	40.0	112.2 g
5,000	69.0	74.0	38.0	107.5 g

*"g" is the specific gravity of the oil at the pumping temperature.

TABLE 4—90 PER CENT MAXIMUM EFFICIENCY PUMPS

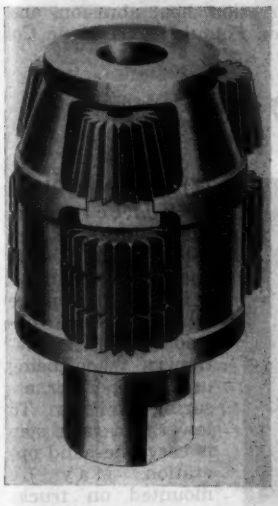
Viscosity, S.S.U. at pumping temperature	Performances as percentages of the performance with water, all at maximum efficiency			
	Capacity	Head	Efficiency	Horsepower*
50	100.0	100.0	90.0	100.0 g
80	100.0	100.0	90.0	100.0 g
100	100.0	100.0	89.5	100.5 g
150	100.0	100.0	88.0	102.2 g
200	100.0	99.5	86.0	104.1 g
300	99.5	99.0	83.5	106.1 g
400	99.5	98.0	81.0	108.5 g
500	99.0	98.0	79.0	110.5 g
600	98.5	97.0	77.5	111.0 g
700	98.0	96.5	76.0	112.0 g
800	97.5	96.0	74.5	113.2 g
900	97.0	96.0	73.5	114.0 g
1,000	96.5	95.5	72.0	115.2 g
1,500	94.0	93.5	68.0	116.2 g
2,000	92.0	92.0	64.5	118.0 g
2,500	90.0	90.5	62.0	118.3 g
3,000	87.5	90.0	60.0	118.0 g
4,000	83.0	87.7	56.0	117.0 g
5,000	80.0	86.0	54.0	114.6 g

*"g" is the specific gravity of the oil at the pumping temperature.

OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

by John M. Spears



(1) SINGLE-EXPANSION CUTTER HEAD employs three cylinder cutters and one cone cutter per row. Three-tier head cleans heavy deposits from straight tubes 2¼-in. to 4¾-in. i.d. Cutters employed in head are of the new-form type, which permits repeated tube cleaning operations without tracking or damaging tube walls. It is self-feeding and is fitted with renewable pin plates which permits on-the-job disassembly. *Airetool Manufacturing Co.*

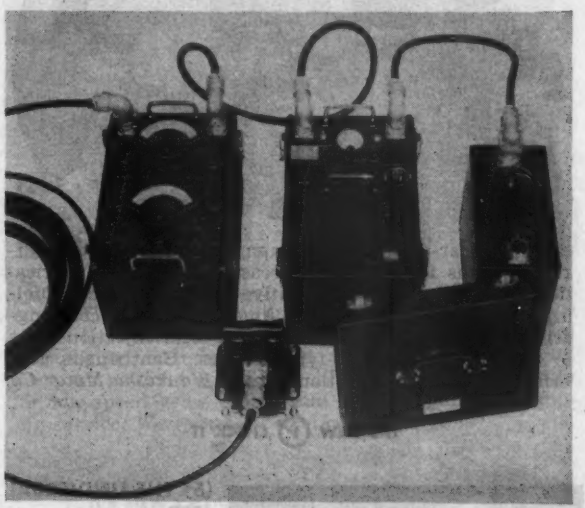
IT'S NEW CHECK IT

(2) FORTY-FOOT LAUNCHES for use in coastal fields and Lake Maracaibo, have a speed of 22 mph. and are powered by twin screws connected to two General

Motors diesel engines. Hull is of all-steel-welded construction and upper portion is of aluminum. Seating capacity of 30 men. Draft is only 2 ft. 8 in. Fuel capacity is 370 gal. *Avondale Marine Ways, Inc.*

IT'S NEW CHECK IT

(3) ELECTROFLUX THICKNESS GAGE is a new instrument for measuring corrosion and well thickness from one side of metallic surfaces. Instrument is designed for the nondestructive inspection and testing of metallic containers, vessels, and piping while in service. Vastly



increases the scope of inspecting and testing pipe, boilers, and pressure vessels. Measures thickness within 3 per cent of actual thickness. Unit combines a four-electrode probe, a small six-volt battery, an electronic voltmeter and power supply for measuring the low-voltage output from the probe, and interconnecting cables to permit probe to be moved about at a distance from the metering equipment. Portable and weighs 55 lb. *Scott Electroflux Co.*

IT'S NEW CHECK IT

(4) SUPER-DUTY DIESEL ENGINE, a six-cylinder model operating on four-stroke cycle, accelerates quickly, starts promptly, has low peak pressures, and over-all economy. Unit rates 90 hp. at 1,300 r.p.m. Cylinder heads are twin castings, interchangeable front and rear. Chrome-silicon alloy valves in hardened valve guides.

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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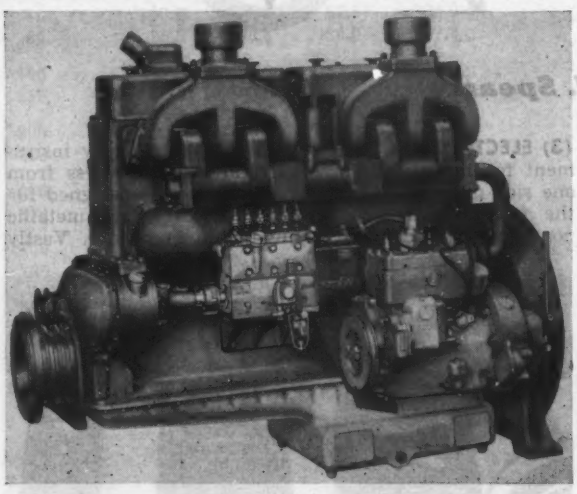
OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

Removable wet-sleeve cylinders are supported in heavy upper and lower main-crankcase decks. Crankcase and cylinder blocks are of one-piece construction. Large-



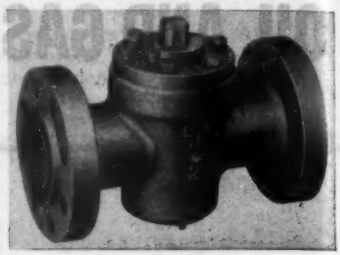
capacity gear-driven water pump forces coolant in directed paths to vital head areas. Full-pressure lubrication by outside-mounted, positive-gear type pump. Fuel-injection system consists of American Bosch coupling-driven injection pump with drawn-steel injection lines to single orifice pintle-type nozzles. Centrifugal governor is driven by injection pumps. *Waukesha Motor Co.*

IT'S NEW CHECK IT

(5) THE UNIVERSAL JEEP improved post-war version of military Jeep, is now being used extensively in oil-field and pipe-line operations. It is particularly valuable as a means of transportation for workmen, small tools, and supervisors to isolated points along pipe-line right-of-way which are served by no road or trail, and are inaccessible to ordinary means of travel. Jeep is also used to pull sleds, wagons, and trailers loaded with various types of equipment — including fire-fighting equipment for refinery protection. Equipped with a General Electric generator, powered direct from the vehicle's motor, Jeep has proved to be a valuable unit for welding repairs to heavy tractors, pipe-line tie-ins, and other service. *Willis-Overland Motors,, Inc.*

IT'S NEW CHECK IT

(6) NONLUBRICATED PLUG VALVE features a straight, nontapered plug that requires no lubrication and is suspended top and bottom on sealed ball bearings which take the thrust radially. Plug is only moving part. A quarter turn opens and closes valve at high pressure and temperatures, requiring very little torque. "Floating" seats of hardened steel are ground and lapped for a precision fit with plug for tight seal at each port. Plug does not touch body at any point, keeping friction to a minimum. Behind each seat, an expansion gland forces seat tightly against plug with just enough "give" to prevent plug from seizing or sticking. Straight-line flow offers no restrictions, creates no turbulence, and resists corrosion, heat abrasion, and product contamination. *Johnson Foundry & Machine Co.*

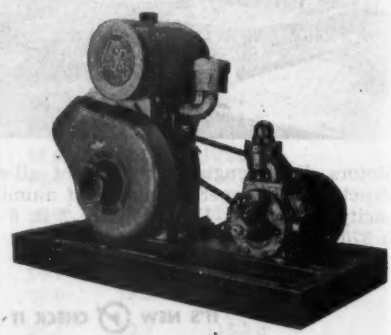


IT'S NEW CHECK IT

(7) NEW TRUCK STEP incorporates the no-break feature —it automatically slides under truck without damage when striking obstacle. Step is stationary when being used by operator, assuring safety. To lower and raise step is easy one-hand operation. May be mounted on trucks or trailers by attaching direct to body or sills with four bolts and blocking down when necessary. Saves injuries, fatigue, and increases efficiency of operators. *Extendo Corp.*

IT'S NEW CHECK IT

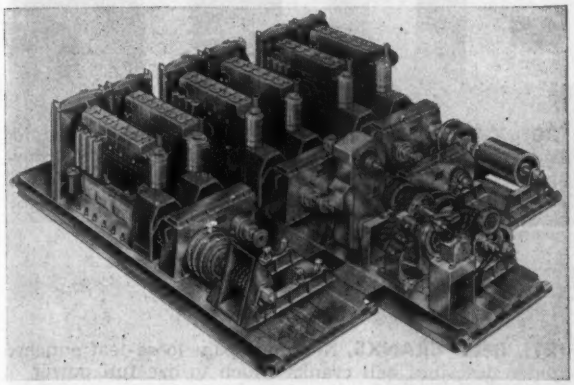
(8) TANK-BOTTOM CIRCULATION UNIT enables easy treating of oil at low operating cost. Oil passes through pump with minimum disturbance. No gears or high velocity impellers to churn and whip up tighter emulsions. Bucket-type impellers and liners can be replaced in a few minutes. Wearing parts easily and inexpensively replaced. Standard units handle 27 and 50 bbl. per hour. *Southwest Equipment Co.*



IT'S NEW CHECK IT

(9) MULTIPLE ENGINE RIG and pump drive, for drilling to 20,000 ft., is powered by six 240-hp. Model L1-600 Cummins diesel engines and develops 1,440 hp. at

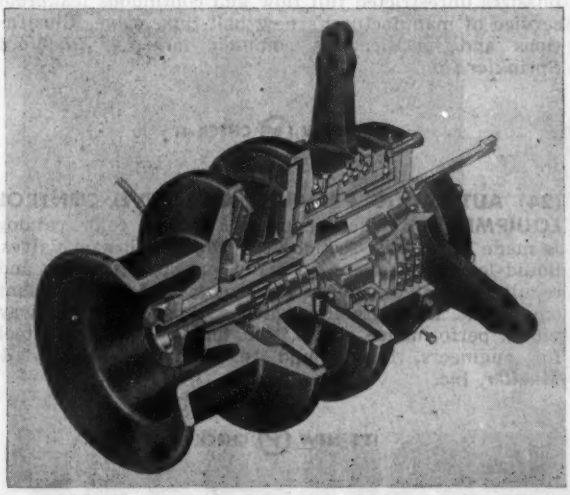
900 r.p.m. Swinging compound interconnecting each dual-engine unit has no chains to disconnect and no guards to remove when moving from one location to another. Multiple unit can be converted into power groups for two or more engine operation without ad-



ditional parts or scrapping any part of the original assembly. Whole setup can be transported on only three trucks without removing the skids. Air throttle controls at the driller's position regulate speed and synchronize all engines with combination foot and hand throttle control for operating combined engines for hoisting. An 18-in. Fawick air clutch on each engine, controlled from the driller's position, permits speedy and complete disengagement of engine from its rotating element. Any engine can be easily removed from the drive group for repairs without interfering with continuous operation of the remaining units. *Mid-Continent Supply Co.*

IT'S NEW CHECK IT

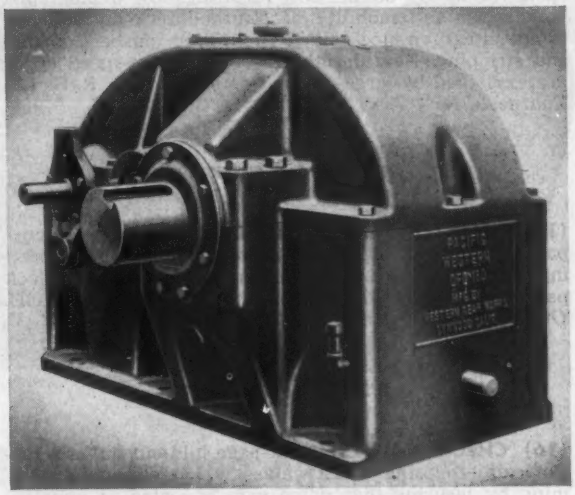
(10) SIMPLO-FRICTION CATHEADS (in both makeup and breakdown types) has activating mechanism immediately on the shaft next to draw works. Catheads extend only 25 in. from draw works. Because the center



of line pull is so close to the draw works it helps eliminate kinking of shafts during a hard pull. There are no toggles to get out of order. Simplo-friction nonadjusting activating mechanism gives 95 per cent clutch efficiency. Only expendable parts are the long-life bearings. Catline spool is extra large. *American Iron & Machine Works Co.*

IT'S NEW CHECK IT

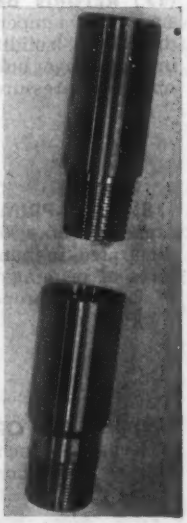
(11) OILFIELD SPEED REDUCERS feature precision-generated, heat-treated, herringbone gears for durability and long life. All pinion shafts are of alloy steel. No



adjustments are necessary on heavy-duty roller bearings which have positive continuous lubrication. Reducer is internally balanced, requiring no thrust bearings. Rugged construction includes oil and dust-proof housing with large oil reservoirs. Crankshaft provides ample rigidity for low-speed gears and cranks used on oil-well-pumping service. *Western Gear Works.*

IT'S NEW CHECK IT

(12) TUBING TOOL JOINTS save time, tubing, and drill pipe on workover jobs, and exploration and water-well drilling. Joints eliminate necessity of picking up drill pipe; save wear on threads, excessive trips, and hammering couplings. Joints have the same o.d. as the external upset couplings; same bore as the tubing. Made with heat-treated alloy steel, accurately machined. *Gulf Tool Co.*



IT'S NEW CHECK IT

TRADE LITERATURE

(13 ELECTRIC PILOT SERVICE. An eight-page two-color bulletin describes various services performed through the use of electric pilot, a device which enables oil-field engineers to obtain more accurate data regard-

ing subsurface well conditions, to plan workover programs, and to direct acidizing treatments into desired formations. Service includes selective acidizing, water locating, permeability surveys, spinner surveys, and caliper surveys. *Dowell Incorporated.*

IT'S NEW CHECK IT

(14) RUBBER-TIRED TOURNADOZER. New broadside opens to 23 by 33 in. and illustrates by photographs how speed and mobility of Tournadozer can be used to advantage on stockpiling, backfilling, pusher loading, and stripping. New design features in high-speed dozer are explained by large-size job-action photos. *R. G. LeTourneau, Inc.*

IT'S NEW CHECK IT

(15) TWO-ZONE PRESSURE-LOCK PACKER. A four-page two-color folder contains illustrations and operating details on the installation and use of pressure-lock packer specifically designed for dually completed wells. *Otis Pressure Control, Inc.*

IT'S NEW CHECK IT

(16) CHECK VALVES. A six-page fold-out bulletin features quiet-closing check valves which eliminate slamming by insuring that valve gate is seated at approximately the time the water column in pump discharge line comes to rest. Table of dimensions and points of superiority listed. *Rennselaer Valve Co.*

IT'S NEW CHECK IT

(17) RETURN BENDS. Greater strength for high pressures and temperature by strong top construction and directional solidification in return bends is stressed in eight-page bulletin. Dimensions and maximum safe operating pressures included. *Ohio Steel Foundry Co.*

IT'S NEW CHECK IT

(18) SELF-PRIMING CENTRIFUGAL PUMPS, with capacities of 3,000 to 90,000 g.p.h., are described and illustrated in handy new 12-page bulletin. Design features of priming valve assure delivery of right amount of water at proper itme. Specifications included. *Novo Engine Co.*

IT'S NEW CHECK IT

(19) REGULATORS AND NOBATRONS. New two-color technical brochure covers voltage regulators and nobatrons for laboratory, pilot plant, and refining precision applications. Stresses fact that electronic control circuits in regulators eliminate inertia of mechanical moving parts, and gives quick, accurate response to small voltage changes with no time lag. Material includes principle of operation and index of models. *Sorenson & Co., Inc.*

IT'S NEW CHECK IT

(20) V-BELT SHEAVES. New 16-page 2-color catalog lists in easy chart form manufacturer's standard-groove sheaves and V-belts. Provides excellent reference for all sheave applications. *American Gear & Mfg. Co.*

IT'S NEW CHECK IT

(21) BELL CRANKS. New four-page loose-leaf punched folder describes bell cranks which utilize full power of pumping unit—pitman bracket is bolted to beam and not through beam, thereby permitting adjustment to increase or decrease rod stroke. Also includes prices of each part. *W. C. Norris, Manufacturer, Inc.*

IT'S NEW CHECK IT

(22) SEISMOGRAPH AND CORE DRILLS. An 18-page bulletin gives complete information on portable drilling machines and drilling supplies. Field photographs and specifications on various drills included in descriptive material. *Franks Manufacturing Co.*

IT'S NEW CHECK IT

(23) BELL-TYPE VALVES. New two-color folder emphasizes unrestricted full flow and continuous leakproof service of manufacturer's new ball-type valve. Illustrations and specifications complete material. *Rockford Sprinkler Co.*

IT'S NEW CHECK IT

(24) AUTOMATIC PRESSURE AND LEVEL-CONTROL EQUIPMENT A comprehensive 114-page color catalog is made up of five sections covering diaphragm valves, liquid-level controllers, strainers, pressure-reducing and regulating valves, pump governors, and steam plant equipment. Liberally illustrated with over 250 cutaway views, performance charts, and tables. A working tool for engineers. Ring bound to open flat. *Kieley & Mueller, Inc.*

IT'S NEW CHECK IT

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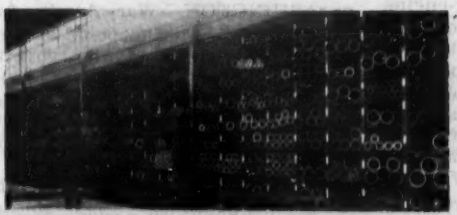

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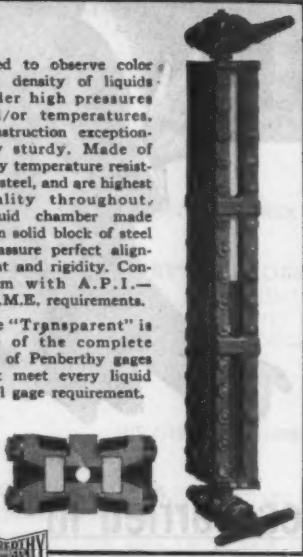

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REFINING

British-American Announces $17,500,000 Expansion

British American Oil Co., Ltd., has announced a refinery expansion program costing approximately $17,500,000 to meet an increasing demand for petroleum products. Expansion of the company's Montreal refineries involve $15,000,000, and the two projects at Clarkson, near Toronto, will cost $2,500,000.

Capacity of the Montreal refineries will be increased from 15,000 to 35,000 bbl. of crude daily. A new Fluid catalytic cracking refinery for the manufacture of high-octane gasoline is to be completed within 18 months. Provisions will be made to increase the production of kerosine, jet-engine fuel, fuel oil, distillates, and solvents.

One of the Clarkson projects is to increase the capacity of the plant at a cost of $1,500,000, while the other will modernize and stream line the blending and packaging plant at a cost of $1,000,000. *The Oil and Gas Journal, September 13, 1947, page 129).* The first project is to be completed by the middle of 1948 and the other by the end of 1948.

Sunray Continues Work On Duncan Property

Sunray Oil Corp.'s pipe line from Velma field to the company's new refinery at Duncan, Okla., is expected to begin carrying its first crude probably next week. More than 26 miles of pipe eastward from the refinery have already been completed.

Sunray estimated that it will duplicate the more than $5,000,000 which it paid War Assets Administration for the refinery, by the time it completes its 93-mile pipe line between Allen and Duncan, Okla., and through remodeling and additions to the refinery.

Carter Resumes Work On Billings Refinery

Carter Oil Co.'s new refinery 2½ miles east of Billings, Mont., is again under construction after a work stoppage called last July to permit refiguring costs for the plant.

The 20,000-bbl.-per-day refinery is expected to be completed and in operation in early 1949, according to Fluor Corp., Ltd., which has the general construction contract.

According to Carter officials the "cost is impossible to predict, but it is expected to be around 2½ times the original estimate" of $8,000,000.

Pure Oil and Union Plan Toledo Meeting

Top officials of Pure Oil Co. and the Oil Workers International Union are to meet this week in Toledo, Ohio, in another effort to settle a strike in Pure's Toledo refinery more than 200 days old.

Only Seven Plants Left On WAA's Available List

WASHINGTON.—War Assets Administration has disposed of more than three-fourths of the government-owned refineries erected during the war to produce aviation gasoline, according to a WAA announcement October 13. These facilities cost the Government $260,000,000.

Of the 33 aviation-gasoline and related plants which became surplus only seven remain on WAA's list of available plants.

WAA said that 22 refineries, which cost $167,000,000, have been sold in whole or in part for a total of $53,700,000. This is more than 100 per cent of their appraised fair value of $53,500,000. Two have been leased, and two were withdrawn from surplus and turned over to the Office of Rubber Reserve.

The seven plants remaining for disposal cost a total of $44,782,447. These include four refineries and three toluene plants. The refineries are: Republic Oil Refining Co., Texas City, Tex., cost $10,030,982; Wilshire Oil Co., Norwalk, Calif., cost $8,529,000; Ashland Oil & Refining Co., Catlettsburg, Ky., cost $16,056,174; and Standard Oil Co. of New Jersey, Baton Rouge, La., cost $2,728,291. The remaining toluene plants are: Magnolia Petroleum Co., Beaumont, Tex., cost $3,046,000; Standard Oil Co. of New Jersey, Baton Rouge, La., cost $3,116,000; and Continental Oil Co., Ponca City, Okla., cost $1,276,000.

As for the Ashland Oil & Refining plant at Catlettsburg, the company late in September entered the only bid for purchase of the property, offering $2,153,125.

The plants withdrawn from surplus were the Premier Oil Refining Co. plant, Cotton Valley, La., and the Great Southern Corp. plant, Corpus Christi, Tex.

WAA officials noted that, with one exception—the J. S. Abercrombie and Harrison Oil Co. facility at Sweeney, Tex.—the government-owned plants were built as adjuncts to privately owned refineries and were operated by these refineries with feed stocks diverted from the normal operations of the existing plants. Consequently, the wartime lessee was usually the only logical purchaser of the government-owned facilities.

WAA said liquidation of the remaining plants is scheduled for completion by the first of the year.

The aviation-gasoline and related surplus plants have been disposed of as shown in the accompanying table.

GOVERNMENT PLANT DISPOSALS

SALES

Name and location—	Acquisition cost of portion sold	Fair value	Sales price	Purchaser
American Liberty Oil Co., Texas City, Tex.	$11,070,909	$3,700,000	$3,250,000	Petrol Terminal Corp., Philadelphia
Anderson-Prichard Ref. Co., Cyril, Okla.	244,454	83,000	83,000	Anderson-Prichard Refining Co.
J. S. Abercrombie and Harrison Oil, Sweeny, Tex.	26,252,187	13,910,930	13,100,000	Alamo Refining Co.
Associated Refineries, Inc., Duncan, Okla.	12,126,883	2,588,000	5,100,000	Sunray Oil Corp.
Bay Petroleum Co., Denver	125,001	46,000	46,000	Bay Petroleum Co.
Baytown Ord. Works (Humble), Baytown, Tex.	14,185,856	6,948,394	6,948,394	Humble Oil & Refining Co.
Continental Oil Co., Ponca City, Okla.	16,798,532	3,942,797	3,125,000	Continental Oil Co.
Cooperative Refinery Assn., Coffeyville, Kans.	4,656,804	1,375,000	1,200,000	Cooperative Refinery Association
Crown Central Petroleum Corp., Pasadena, Tex.	15,009,165	2,496,000	2,300,000	Crown Central Petroleum Corp.
Diakel Corp., Cincinnati, Ohio	2,432,889	1,270,000	1,090,669	Davison Chemical Corp.
Eastern States Petroleum Co., Houston	11,150,230	1,797,000	2,000,000	Eastern States Petroleum Co.
Eastern States Petroleum Co., Houston	403,014	91,878	91,878	Eastern States Petroleum Co.
Frontier Refining Co., Cheyenne, Wyo.	7,885,030	1,256,250	1,242,500	Frontier Refining Co.
Humble Oil & Refining Co., Baytown, Tex.	882,578	348,358	380,899	Humble Oil & Refining Co.
Houdry Process Corp., Paulsboro, N. J.	1,036,835	396,132	260,000	Houdry Process Corp.
Pan American Refining Corp., Texas City, Tex.	2,823,230	443,000	411,500	Pan American Refining Corp.
Pennzoil Co., Oil City, Pa.	4,075,899	1,210,435	1,230,125	Koppers Co.
Pure Oil Co., Smiths Bluff, Tex.	3,328,057	730,862	630,200	Pure Oil Co.
Root Petroleum Co., El Dorado, Ark.	5,979,224	1,395,815	1,100,000	Root Petroleum Co.
Standard Oil Co. of California, Richmond, Calif.	21,409,000	5,339,630	6,000,000	Standard Oil Co. of California
Utah Oil Refining Co., Salt Lake City, Utah	14,386,479	4,148,300	4,148,300	Utah Oil Refining Co.
Utah Oil Refining Co., Fort Laramie, Wyo.	107,781	11,180	11,180	Stanolind Pipe Line Co.

LEASED

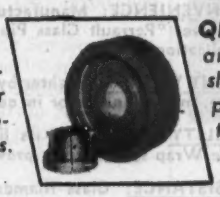
	Acquisition cost total	Portion leased	Lessee
American Cyanamid & Chemical Co., Fort Worth	$2,275,818	$1,960,361	American Cyanamid & Chemical Co.
Mohawk Petroleum Corp., Bakersfield, Calif	4,680,000	1,519,148	Standard Oil Co. of California

NOTE: WAA listed factors contributing to the difference between the cost of portions sold and the sales price as: (1) general excessive wartime costs; (2) change orders during construction and operation due to rapidly developing improvements in equipment and design, many of the units never having been tested in commercial production prior to the war; (3) use of high-cost materials to conserve critical materials; (4) high rate of depreciation; (5) high rate of obsolescence as many units apparently have no economical peacetime use; (6) exclusion of certain valueless service costs and other charges in sales of equipment for salvage.

SPECIFY TRANSCO V-DRIVES

FOR FAST DELIVERY FROM STOCKS IN THE SOUTHWEST

BOLTRIM SHEAVES—*The original demountable rim sheave, improved to better meet today's requirements. Quick shipment with either standard or special hubs.*



QD SHEAVES—*The original and most popular tapered sleeve type sheave for compression fit on the shaft. Easy to put on—easy to remove. Rims can be changed without dismounting hub.*

COMBINATION GROOVE SHEAVES—*Carried in jobber stocks everywhere for use with either A or B V-belts, these lighter weight sheaves meet a large percentage of all V-drive needs and are available at lower cost because of high production.*

SPECIAL SHEAVES—*With our own foundry facilities, we can offer prompt service on any required special sheaves, up to 56" PD and any face width.*

GOODRICH V-BELTS—*Goodrich V-Belts are carried in stock in all popular sizes plus some few of those which are less widely used. Goodrich quality plus well matched sets means better service from your drives.*

TRANSMISSION MACHINERY CORPORATION
DALLAS, TEXAS

Plus Features of...

*PERRAULT GLASS PIPE WRAP

MANUFACTURED BY THE
Glasfloss CORPORATION
New York 17, New York

1. **STRENGTH**: Excellent strength factors are obtained from millions of continuous glass filaments which prevent rips, wrinkles or tears during application.
2. **INITIAL ABSORBENCY**: *Perrault Glass Pipe Wrap has a natural affinity which causes it to pick up more coating than other materials of the same thickness, thus eliminating "holidays."
3. **SUPERIOR CONSTRUCTION**: *Perrault Glass Pipe Wrap is similar to woven material with continuous filaments traveling across its entire width in contrast to the short fibre or "Jack Straw" construction of other types of wrapping.
4. **QUALITY**: *Perrault Glass Pipe Wrap is always uniform in thickness, width and length.
5. **CONVENIENCE**: Manufactured in rolls 4", 6", 9", 12", 18" wide, 400 feet long with 3" core, *Perrault Glass Pipe Wrap is available in a form best suited to your particular application.
6. **LIGHT WEIGHT**: Lighter by far than old style wrappings, *Perrault Glass Pipe Wrap saves time, money and labor in quicker and easier installations.
7. **UTILITY**: Because of its light weight, uniformity, and great strength, *Perrault Glass Pipe Wrap spools freely providing use of every foot in every roll without tearing.
8. **RESISTANCE**: Glass filaments are flexible, highly permanent, and resistant to mildew, rot and moisture, as well as the corrosive action of soil.
9. **POSITIVE PROTECTION**: Glass filaments as well as binding materials are non-reactive which assures complete physical, chemical and electrical protection of your pipe lines.
10. **ECONOMY**: The greater uniformity and strength of *Perrault Glass Pipe Wrap provides better protection resulting in much longer pipe line life for the same amount of money.

Manufactured and Engineered by the Glasfloss Corporation for Distribution by Perrault Brothers.

PROTECT YOUR PIPE LINE WITH A LONG TERM INVESTMENT THAT WILL PAY DIVIDENDS FOR YEARS TO COME!

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PIPE LINES

Transcontinental Plans Texas-New York Gas Line

PLANS have been made for the construction of Transcontinental Pipe Line Co.'s 1,800-mile, 26-in. natural-gas line from the Rio Grande Valley to New York, according to Claude Williams, president.

A Federal Power Commission hearing is scheduled on October 27 to consider the application for permit.

The project entails construction of a single 26-in. gas line from Texas' lower valley to New York to cost approximately $150,000,000. Construction is to start in March 1949; completion is scheduled in November 1950.

The main line will originate in the vicinity of the Lacy and McAllen gas fields in Cameron and Hidalgo counties, Texas, and will follow the coastline about 75 miles inland to Baton Rouge, La. There the line will turn northeastward via Atlanta, Ga., Baltimore, Md., Philadelphia, to New York and Brooklyn.

Williams, Texas assistant secretary of state in 1939-40, and later head of the Texas Employment Compensation Commission, said a large number of Texans had invested in the project with the larger phases of the financing having been taken over by a group of New York investment bankers and by several insurance companies whose names will be revealed at the October 27 hearing.

The 16 compressor stations for the line are to be equipped with reciprocating compressors. Design of the project is being handled by Fish Engineering Co.

Negotiations for commitments for gas have been made with the expectation that a permit may be obtained about March 31, 1948. Agreements call for taking gas within 30 months after the permit is granted.

The line has been designed to have a capacity of 375,000,000 cu. ft. daily. Agreements have been made to purchase between 380,000,000 and 390,000,000 cu. ft. daily of which 65,000,000 cu. ft. is to be flare gas. Some of the major deliveries of gas are to be obtained from Texas gas fields in the following amounts: McAllen, 80,000,000 cu. ft.; Lacy, 75,000,000 cu. ft.; Starr County, 30,000,000 cu. ft.; La Gloria, 50,000,000 cu. ft.; Alice, 25,000,0000 cu. ft.; Wade City and Orange Grove, 25,000,000 cu. ft. A branch line to Odem, Luby, and other fields in the vicinity is to transmit 37,000,000 cu. ft. Two companies at Jennings, La., are to furnish 10,000,000 cu. ft. daily.

Plans call for delivering approximately 325,000,000 cu. ft. to eastern connections. Principal deliveries totaling 300,000,000 cu. ft. daily are to be as follows: Philadelphia Electric Co., 70,000,000 cu. ft.; Public Service Co. of New Jersey, Newark, 70,000,000 cu. ft.; Consolidated Edison Co., New York, 100,000,000 cu. ft.; and Brooklyn Union Gas Co., 60,000,000 cu. ft. daily.

The New York Public Service Commission is to intervene in support of Transcontinental Pipe Line Co.'s application for a permit from FPC.

It is possible that, in addition to the 300,000,000 cu. ft. deliveries enumer-

O. R. Smith, president, Smith Contracting Co. and O. R. Smith Manufacturing Co., with his twin-engine Beechcraft plane at the Fort Worth airport

CRC

PIPE LINE CONSTRUCTION EQUIPMENT

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Pipe Line Equipment and Materials
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There's an easy way to get rid of pipe corrosion worries. Before you place steel pipe in underground service, call in Pipe Line Service engineers to protect it for you.

Once the type of protection is selected, your worries are over because these specialists have the experience and facilities to assume all responsibility and handle all details for you —right down the line.

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It will pay you to get the complete facts today.

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Pioneers in Steel Pipe Protection

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ated above, arrangements will be made, according to Williams, to furnish 25,000,000 cu. ft. daily to the Brooklyn Burrough Gas Co., Long Island Gas & Light Co., Queens County Gas Co., and New York & Richmond Gas Co. The latter serves the Staten Island area.

Interstate Contracts for Mississippi Loop Job

A contract has been let by Interstate Oil Pipe Line Co. to Latex Construction Co., Houston, for the construction of 17½ miles of 10-in. line to complete the looping of the company's trunk line between Cranfield and Liberty Station, Miss.

When completed, the loop will increase the capacity of the Cranfield-Liberty line to between 55,000 and 60,000 bbl. per day, and will give Interstate one 8-in. and one 10-in. line between those points. The new loop is part of Interstate's trunk-line system from Delhi field, northeast Louisiana, southward to Baton Rouge. Half of the loop was constructed and placed into operation in June of this year.

Gulf Prepares for Laying Loop Lines

Gulf Refining Co., Tulsa pipe line division, started laying pipe this week for 48 miles of 10-in. looping east of the Mississippi River. Sheehan Pipe Line Construction Co.. has a spread in the field at the eastern end laying 40 miles of the looping. At the western end, T. & L. Construction Co. has a spread in the field for laying 8 miles in Illinois.

Work Starts on Stanolind's La Plata-Fort Madison Loop

Stanolind Pipe Line Co. had laid more than 91 miles of pipe of the 190 miles of looping which has been under way for the main line in Illinois in recent weeks.

O. C. Whitaker Co. which recently contracted the 74-mile La Plata, Mo.-Fort Madison, Iowa, loop started to lay pipe last week. The current looping project entailing the laying of a total of 264 miles of 20 and 22-in. will complete a continuous big-incn crude-oil line from Drumright, Okla., to Whiting, Ind.

Wyco Deliveries to Start Early in 1948

Construction of the pipe line for Wyco Pipe Line Co.'s Casper, Wyo.-Denver products pipe line is reported to be making good progress. Pump stations and terminals are to be finished late this year. Deliveries are scheduled to commence soon after the first of next year.

Latex Has Big Spring Office for New Line

For the laying of 253 miles of 22-in. pipe for the Midland-Wichita Falls, Tex., section of the Jal-Cushing project, Latex Construction Co. is establishing field offices at Big Spring, Tex.

Latex operations for the job are being supervised by E. C. Norris, spread superintendent.

"Jal-Cushing" is the official designation applied to the crude-oil pipeline project being undertaken by The Texas Pipe Line Co., Shell Pipe Line Corp., Empire Pipeline Co. and Sinclair Refining Co. on an undivided interest basis.

Right-of-Way Clearing Contract Awarded

Interstate Oil Pipe Line Co. has let a contract to Foster & Childress, Wisner, La., for the clearing of 8 miles of right-of-way in preparation for the laying of 8 miles of double 12-in. line in the Morganza Floodway, Pointe Coupee Parish, Louisiana.

The new line will replace six 8-in. lines between Melville and Fordoche, La., on the company's Moore to Anchorage trunk line system. Clearing of the right-of-way and stringing of the pipe will be done

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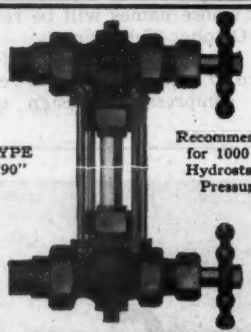

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Made of Chromium-Molybdenuin alloy temperature resisting steel, extra heavy throughout and stainless steel trimmed. Positive automatic shut-off; stainless steel balls shut off the flow of liquid if glass breaks. Regrinding removable seats, heavy duty stuffing boxes, union connections. Conform with A.P.I.—A.S.M.E. requirements.

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In the pipe line construction business, Oklahoma Contracting Co., Inc., gets the oil industry's OK of approval. For almost 30 years "OK" jobs all over the world have given us an enviable reputation. On that next pipe line job of yours get an "OK."

OKLAHOMA
CONTRACTING CO., INC.
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DALLAS 1, TEXAS

under contract, and Interstate will lay the new lines with its own crews.

Colorado Interstate Puts New Line in Operation

Denver's second natural-gas pipe line was officially placed in operation October 15 when Mayor J. Quigg Newton opened the valve which turned gas into the city distribution system of Public Service Co. of Colorado. The new 20-in. line increases available supply more than 2½ times, from 83,000,000 cu. ft. per day to 215,000,000 cu. ft. per day when full capacity is attained.

Robert W. Hendee, president, Colorado Interstate Gas Co. which built the new line, J. E. Loiseau, president, Public Service Co. of Colorado, assisted in the turn-on ceremonies.

Pipe-line construction was completed in 122 days of elapsed time and on schedule as originally planned. Cost of the project is about $12,500,000. J. R. Horrigan was the general contractor; Ford, Bacon & Davis were consulting engineers; Stearns-Roger Manufacturing Co. were contractors on the compressor station. Youngstown Sheet & Tube Co. supplied the pipe.

Natural gas was first brought to Denver in June 1928 from the Amarillo, Tex., field through a 340-mile pipe line. This older line is 22 in. in diameter from the field to the Pueblo, Colo., takeoff and 20 in. from there to Denver. It supplies Denver and the pipe line of Colorado-Wyoming Gas Co., a subsidiary of Public Service Co. of Colorado.

Colorado-Wyoming Gas Co. planned a second pipe line from Denver to Cheyenne this year but delay in pipe delivery has held up the construction until next year. As a result restrictions are now in effect in the towns and area served by Colorado-Wyoming Gas Co.

It has been necessary for Public Service Co. of Colorado to build extensive city mains to provide for present househeating and load growth generally. Approximately 20,000 new househeating customers will be added in Denver in 1947. A total of about 39,000 househeating customers had been served in Denver for the entire period prior to 1947.

The completion of this second pipe line to Denver assures an ample supply of natural gas for many years for domestic and househeating requirements.

Nebraska Loop Finished For Chicago Gas Line

Natural Gas Pipeline Co. of America completed last week a 70-mile, 26-in. loop on its trunk line to Chicago. The loop was contracted by J. R. Horrigan Construction Co. and Oscar E. Dempsey.

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PIPE COATING and WRAPPING MACHINES
Stationary and Line Traveling

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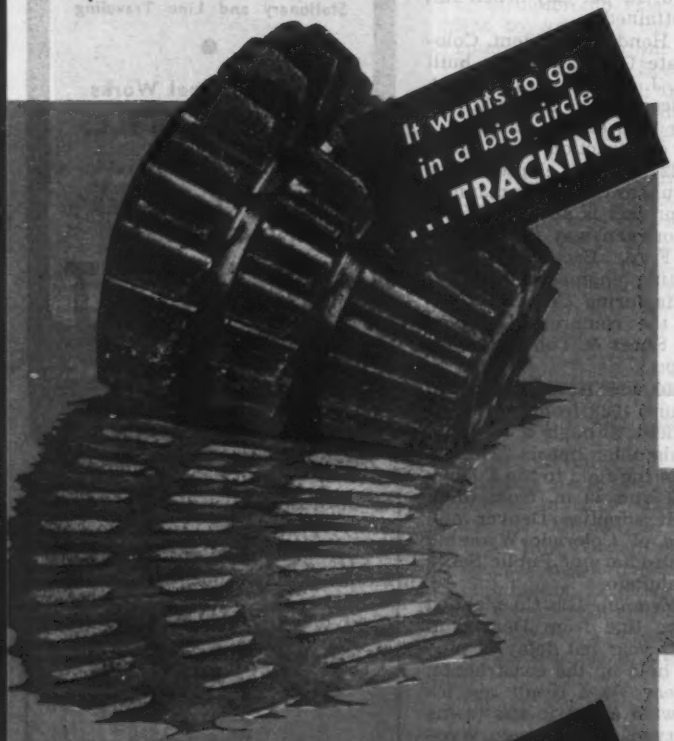
SURVEYING & MAPPING

PIPE LINE SURVEYS

Why REED ROCK BITS give FASTER DRILLING

These photographs of a REED 2C CROSS ROLLER CUTTER in action show why the twisting-tearing action of each of the *four* cutters of a Reed Rock Bit gives faster drilling and more hole per bit.



This photograph shows what *would* happen *if* Reed cutters were designed to track. The direct pounding action would throw very little formation up into the mud stream. Furthermore, cutter teeth would tend to gum up and lose drilling efficiency.

This photograph shows how the Reed cutters actually twist and tear the formation as they ***penetrate***. Notice that pieces of formation are actually thrown up into the mud stream to be carried to the surface. This plowing action also helps to keep the teeth clean.

Reed pioneered the Cross Roller principle of design

NATURAL GAS

Michigan Consolidated, Panhandle Hearing Set

WASHINGTON.—The Federal Power Commission has scheduled a hearing for January 12 in regard to the sale and delivery of natural gas by Panhandle Eastern Pipe Line Co. to Michigan Consolidated Gas Co. on a firm basis to supply requirements of certain large industrial customers in Detroit.

At the same time, the commission dismissed an application filed by Michigan Consolidated requesting a rehearing on the FPC order of November 2, 1945, allowing rate schedules of Panhandle to take effect and asking the commission to vacate and rescind its finding dated August 16, 1947.

On August 19 the commission filed a compaint in the U. S. District Court for the Eastern District of Michigan, asking an injunction to prevent Panhandle from continuing to sell and Michigan Consolidated from continuing to buy gas for requirements of certain of the industrial customers named. By stipulation among the parties, deliveries by Panhandle to Michigan Consolidated were to be reduced by 20,000,000 cu. ft. per day which was to be delivered by Panhandle to Michigan Gas Storage for storage to assist in meeting winter emergencies.

The stipulation also provided that the issues concerning the rate schedule in question could be made the subject of an appropriate proceeding before the commission by any of the parties. The hearing January 12 is in accordance with this proviso. Michigan Consolidated later filed a complaint against Panhandle alleging principally that the 20,00,000 cu. ft. of gas were not being delivered to Michigan Gas Storage. Hearing in these proceedings has not been concluded.

United Nears Completion Of New Orleans Gas Line

The 18-mile Barataria natural-gas line of United Gas Pipe Line Corp. will soon begin operation to supply New Orleans with nearly one-third more natural-gas delivery capacity.

The Barataria line is the third in the New Orleans area and is the first gas line to cross the Mississippi River below New Orleans. United's line is of the multiple, submarine type. The three 10-in. lines, 3,300 ft. long, have a ½-in. steel wall and a heavy protective coating. The multiple installation provides assurance against interruption of service.

This line will relieve the gas situation for New Orleans and will complement the lines receiving gas from Bayou Perot and Delta Farms fields which serve the east side of New Orleans, thus providing gas to the city on opposite sides of the metropolitan area.

The new line has also been designed to take care of the flare gas which heretofore had been burned because of lack of market and will bring the maximum capacity for the New Orleans area to 272,000,000 cu. ft. daily. It is expected to prove adequate for all major industrial expansion.

Gas-Company Merger Plan To Be Heard October 28

WASHINGTON.—The Federal Power Commission has scheduled a hearing October 28 in Washington on an amended application filed jointly by Memphis Natural Gas Co., Kentucky Natural Gas Corp., and Texas Gas Transmission Corp., requesting authorization for the acquisition by Texas Gas Transmission of the systems and assets of the other two companies and operation thereafter by Texas Gas Transmission.

The amended application was filed in lieu of an earlier proposal made by Memphis to purchase Kentucky's gas system and related assets.

November Meeting Set To Plan Gas Course

Definite planning for the third annual Short Course in Gas Technology to be held at Texas A. & I. College, Kingsville, next spring will begin with a meeting in November of the administrative committee, Dr. Frank H. Dotterweich, committee chairman, announced October 16.

Meeting with Dotterweich, who is director of engineering at A. & I., will be Robert M. Hutchison, Houston Natural Gas Corp., Houston; George E. May, New Orleans Public Service, Inc., New Orleans; W. C. McGee, Tennessee Gas Transmission Co., Houston; C. A. McKinney, United Gas Corp., Houston; and Robert R. Suttle, managing director, Southern Gas Association, Dallas. The association sponsors the short course.

The course has been set for the week of May 31. Committee members will tabulate results of questionnaires mailed to those attending last year's meeting in regards to subject matter to be discussed.

A field trip to view commercial uses of natural gas in the Corpus Christi area will be included. Registrants also will visit natural-gas installations in the immediate vicinity of Kingsville and make a trip to the King ranch.

Compressor Authorized

The Texas Railroad Commission has granted permission to Manley Brothers to install and operate a gas compressor on the C. K. Manley et al lease in Lewis Steffins field, Jones County, West Texas.

Carbon-Black Plant Offered

A Seagraves, Tex., carbon-black plant, designed to produce 13,000,000 lb. of channel-type black yearly and currently operated under interim lease by the Columbian Carbon Co., is being offered for sale or lease by War Assets Administration. Bids will be received by War Assets Administration Regional Office at Grand Prairie, Tex., until November 5.

Natural Gasoline

Phillips, Atlantic Sign L.P.G. Marketing Contract

A long-term contract announced jointly October 15 by Phillips Petroleum Co. and Atlantic Refining Co. provides for the construction of a modern propane plant in the Philadelphia area and marketing of its production in tank car and tank-truck quantities.

The new plant will be an addition to Atlantic's present Philadelphia refinery and will make this company one of the largest producers of propane on the Eastern Seaboard.

Under terms of the contract, Phillips will build a 500,000-gal. propane storage and loading plant adjacent to Atlantic's Point Breeze refinery. Tank car and tank-truck shipments will be made to Phillips customers from this new bulk plant.

Phillips, recognized as a pioneer in the use of L.P.G. for industrial application, gas manufacturing, and in homes, has marketed L.P.G. since 1927. One of its eastern sales offices is located in Philadelphia.

For long, dependable service under any condition in any field

NORRIS SUCKER RODS *are best*

NORRIS Type 20
Carbon Steel
High quality, basic open hearth, close grained carbon steel. Fully normalized. A.P.I. specifications. Box and Pin and Double Pin types. For medium pumping duty.

NORRIS Type 30
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Very high grade, basic open hearth, carbon manganese steel. Fully normalized. A.P.I. specifications. Box and Pin and Double Pin types. For heavy pumping duty.

NORRIS Type 40
Nickel Moly Alloy
Selected nickel moly alloy of great strength, ductility and toughness. Definite corrosion resistance. Fully normalized and tempered. A.P.I. specifications. Double Pin type. For heavy pumping duty of corrosive crudes.

NORRIS Type 50
High Nickel Moly
Selected high nickel moly alloy with extra resistance to shock and corrosion fatigue, combined with strength and ductility. Fully normalized and tempered. A.P.I. specifications. Double Pin type. For heavy pumping duty of highly corrosive crudes.

NORRIS Quality Sucker Rods are a maximum of quality at a minimum of ultimate unit cost because only the finest of everything is manufactured into these sucker rods which have long earned their way. The experience of 65 years of oilfield manufacture is given freely in the exacting production of the four types which will successfully combat your pumping problems. When you buy sucker rods . . . BUY NORRIS!

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Exploration and Drilling

Dollar Hide Extended North

A 1-MILE north extension of the main Devonian pay, and a discovery in the deep Ellenburger for Dollar Hide pool in southwestern Andrews County, in West Texas, practically adjoining the New Mexico line, would be a good enough reason for the interest in Pure Oil Co. and Humble Oil & Refining Co. 1-E on the Cowden "A," SE SW Section 24, Block A-52, PSL Survey. But, in addition to the Devonian and Ellenburger, the well indicated it would produce from the Silurian, for a third pre-Permian pay, and had favorable indications in the Wichita-Albany of the Permian.

A drill-stem test in the Wichita-Albany at 6,700-80 ft., open 3 hours, recovered water blanket, 1,760 ft. of oil, and 100 ft. of oil-and-gas-cut mud. In the Devonian a drill-stem test at 7,562-7,635 ft., open 3 hours, recovered 180 ft. of oil-cut mud and 90 ft. of oil. A second drill-stem test at 7,682-7,743 ft., open 90 minutes, flowed oil in 14 minutes, and recovered 1,080 ft. of oil.

Four drill-stem tests in the Silurian brought the following results: at 8,520-55 ft., a 3-hour test recovered 1,000 ft. of oil and 80 ft. of oil-cut mud; at 8,555-8,605 ft. another 3-hour test recovered 1,200 ft. of oil and 120 ft. of oil-cut mud; at 8,605-55 ft., a 3½-hour test recovered 7,115 ft. of oil; while the fourth test at 8,654-90 ft. recovered 1,290 ft. of oil.

The Ellenburger was topped at 9,975 ft., and quickly showed favorable signs. A drill-stem test at 9,980-10,033 ft. brought a flow of oil in 55 minutes. A second test at 10,040-68 ft. also showed good results. The third, and best test, at 10,068-10,120 ft., flowed at the rate of 87 bbl. of oil per hour, starting to flow in 35 minutes. A fourth test at 10,120-70 ft., open 189 minutes, flowed oil in 68 minutes, and made 81 bbl. of oil in an hour and a half. The last test at 10,169-10,210 ft., open 6 hours, flowed 20 per cent oil and 80 per cent salt water.

If the water level is assumed to be around 10,180 ft., the Ellenburger pay section is approximately 200 ft. thick at this point on the structure. Although the well is not yet formally completed, four Ellenburger offsets have been started, east, south, west, and northwest.

This is the first well to reach the Ellenburger in the field or in the immediate vicinity. Magnolia Petroleum Co. 1-B Cowden, SW SW Section 3, Block A-52, 1 mile south and ¾ mile east of the new Ellenburger producer, was dry in the Silurian at total depth of 8,769 ft. last year, although it has not yet been plugged.

Humble's deep test 1 Cowden, NE NW Section 13, Block A-55, 2¼ miles south and 1 mile east, was dry in the Devonian at 10,757 ft. total depth, far lower than wells to the north of this location. The Humble well is apparently on the downthrow side of a fault, somewhere along the south edge of the presently producing area in the Devonian.

The discovery well will be completed in the Ellenburger to give the Dollar Hide pool its third officially producing pre-Permian pay. These are the Devonian, Silurian, and now the Ellenburger.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

WEST TEXAS.—Additional Clear Fork development adds another pay zone to Keystone field. Hale County is given additional tests in the new Petersburg area.

CALIFORNIA.—British-American and The Texas Co. complete a 50-bbl. oil well ½ mile west of Race Track field which may prove to be either a new discovery or an extension. A third venture is staked in the San Ardo area of Monterey County, based on showings encountered in recent tests.

ARKANSAS.—Gap between Stephens and Wesson fields, Ouachita County, is closed by 125-bbl. oil well. Exploratory and field work on the increase in both Arkansas and North Louisiana.

TEXAS GULF COAST.—Hawkins & Graham open new oil production on the flank of Batson dome in Hardin County, the test producing through perforations at 5,400-10 ft. in the Cockfield-Yegua section. Well flowed at rate of 156 bbl. daily through ⅛-in. choke with 520 psi. working pressure.

WYOMING.—Phillips Petroleum completes first well in Mush Creek, flowing 604 bbl. in 19 hours through tubing. Pure Oil extends Worland field ¾ mile with 771-bbl. producer. Elk Basin discovery flows 768 bbl. per day from lime section not tested when originally completed.

FLORIDA.—Sunniland field receives new 120-bbl. producer, completed through open hole at 11,560-73 ft.

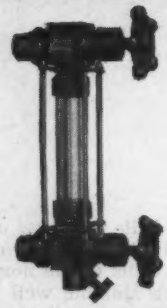
NORTH TEXAS.—So-called "miscellaneous field" area in Archer County produces 1,500-bbl. oil well. Ellis field in Jack County receives large flowing well in Caddo limestone.

OKLAHOMA.—Second well in West Shawnee Lake field drilling ahead for first test of second Wilcox after flowing oil on drill-stem test of first Wilcox. New pool opened in Osage County in Shell Creek Lake area.

COLORADO.—Oil rose 1,000 ft. in 2 hours at Continental's second well in Elk Springs area. Carter will drill second wildcat on North Craig structure in Moffat County.

KANSAS.—New pool opened east of Kraft-Prusa field in Barton County, in Arbuckle lime topped at 3,343 ft. Continental test in Rooks County showing for a possible pool opener.

PENBERTHY
"ALL IRON"
LIQUID LEVEL GAGES



Body made from a special high strength alloy iron, shanks alloy steel and trim stainless steel. Extra heavy construction throughout, automatic and positive shut-off if glass breaks, heavy duty stuffing boxes. Conform with A.P.I.—A.S.M.E. requirements.

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EASTERN TEXAS

Wilson Well Has Good Showing at 5,607 Ft.

DALLAS.—A wildcat attracting considerable interest, with some shows of oil and gas in the Pettit, is Sam E. Wilson Oil Co. 1 Hearne, 5 miles east of Leigh, in Harrison County, and on the northwest flank of the Longwood gas area of Caddo Parish, Louisiana. On first cores of the Pettit, at 5,587-5,607 ft., the recovery was 7 ft. showing oil and gas. A second core at 5,590-5,610 ft. recovered 12 ft., being 2 ft. of hard, dense limestone with gas odor, 1 ft. of slightly porous lime with good oil odor, 4 ft. of medium porous lime with good oil show, and 5 ft. of hard, dense lime with no shows. At 5,610-30 ft., total depth, the recovery was 2 ft. of hard, gray, slightly porous lime with good oil odor; 5 ft. of medium porous lime with good oil odor and stain, and 10 ft. of dense gray lime with slightly gas odor on fresh breaks.

Phillips Petroleum Co. holds offset acreage southeast of the 1 Hearne estate. Phillips is said to have several locations staked, pending outcome of the Hearne test.

Stanolind Oil & Gas Co.'s Harrison County test, the 1 Slaughter, tested the Pettit at 6,390-6,440 ft., flowing 2,210,000 cu. ft. of gas a day, plus 37 bbl. of oil or distillate, testing 61°, A.P.I. Flowing tubing pressure was 2,150 ft., and casing pressure was 1,700 lb. Plug was then set at 6,386-90 ft., to test above 6,386 ft.

Decision to test the section between 6,356-87 ft. may be based on shows found in the 1 Harris, drilled several years ago, about 1½ miles to the southeast of the 1 Slaughter. The 1 Harris had a commercial oil show at 6,330 ft., but failed on completion tests. The 1 Slaughter is running some 40 ft. higher on the Pettit, called at 6,270 ft.

In Freestone County, Humble Oil & Refining Co. 1 R. P. McWatters was drilling below 8,121 ft. in shale and limestone after drill stem testing the Rodessa section, with packer set at 7,683 ft. Using ¼-in. chokes, top and bottom, there was no surface pressure in 1 hour, but gas flowed at the end of 39 minutes, when coming out of the hole. Fluid started unloading after 3,200 ft. of drill stem had been pulled. Total recovery was 2,068 ft. of water cushion, 400 ft. of mud, and 980 ft. of salt water.

Two miles west of Bloomburg, Cass County, Shell Oil Co., Inc. 1 Gerald Smith was drilling ahead below 5,170 ft. in Red Beds and shale. It cored the Paluxy at 4,123-43 ft., recovering 2½ ft. of sandy shale, with no shows; 3 ft. of fairly porous sand, and 1 ft. of hard, crystalline limestone, then 5 ft. of soft sand, with no shows. Shell's 1 F. E. Lumpkin, 4 miles southwest of Cedarville, Kaufman County, was drilling below 5,503 ft. in sand and shale.

In Henderson County, ½ mile west of Trinidad, Ralph E. Fair, Inc. 1 T. T. Bradley reported sample shows on the Paluxy at 5,670-80 ft., with no shows, and the Upper Glen Rose at 5,840-54 ft. Operators were drilling below 6,740 ft. in shale and limestone.

First reports on locations staked last week included: Cass County 1; Henderson County 3, including 2 wildcats and 1 in Opelika; Limestone County 1 wildcat; Panola County, Carthage field, 3; Raines County 1 wildcat, and in Wood County, 2 in Quitman, 1 in southwest extension area of the Merigale field, 1 on southeast edge at Winnsboro, and 1 at Hawkins.

Oil well completions, in fields, were: Talco 1, Cayuga 1, Marion County shallow 3, Carthage 2 gas wells, sand Flat 1, Norman Paul 2, Quitman 2, and Merigale 1.

EAST TEXAS WILDCAT FAILURES

Harrison County: E. C. Johnston 1 Edna Hood, Lucinda Wallace Sur., 12 mi. E Marshall, dry, TD 6,566 ft., Massive anhydrite 4,901-5,156 ft., Pettit 6,005 ft., Lower Pettit porosity 6,164-71 ft., Travis Peak 6,242 ft., by samples, flowed unrestricted amount of gas, shut-in pressure 2,375 lb., elev. 340 ft.

Madison County: Sun Oil Co. 2 James A. Fannin, Thomas Boatwright Sur., 3 mi. SW Madisonville, dry, TD 2,937 ft., no shows.

Navarro County: Coffield & Guthrie, Inc. 1 A. P. Mays, John McNeill Sur., 6 mi. SW Angus, dry, TD 1,998 ft. in chalk.

Van Zandt County: Amerada Petroleum Corp. 1 Lawrence Parker, TP & J. Sparks Sur., 5 mi. NE Edgewood, dry, TD 4,010 ft., no shows.

J. M. DeuPree, Jr. 1 B. W. Bruce, Jr., W. H. Matthews Sur., 6 mi. S Wills Point, dry, TD 4,308 ft., Pecan 2,060 ft., Austin 2,780 ft., by samples.

SOUTH LOUISIANA

Phillips Completes Deep-Sand Discovery

NEW ORLEANS.—A new deep sand discovery on the southeast side of Crowley field, Acadia Parish, has been completed. Phillips Petroleum Co. 2 Onezime, flowed 31 bbl. of condensate and 4,950,000 cu. ft. of gas per day through a 12/64-in. choke with 3,650 psi. flowing pressure on the tubing. Gas ratio was 159,678, and condensate 43.2° gravity. Total depth is 11,940 ft., and production is through perforations at 11 054-72 ft.

Superior Oil Co. of California 1-A Gulf of Mexico on State Lease 884, Block 71, Vermilion area, 19 miles south of the shore line of Vermilion Parish, and 22 miles south of Fresh Water Bayou field production, is drilling ahead below 10,514 ft. in sand and shale. Protection pipe is cemented in the hole at 10,148 ft.

Stanolind Oil & Gas Co. 1 Watkins, discovery well in the East Florence area of Vermilion Parish, Section 23-13s-1w, continues to test. An initial gage produced 65 bbl. of 56°-gravity condensate per day through a 5/64-in. choke with 1,000 psi. flowing pressure on the tubing. Production is through perforations at 7,070-73 ft.

Kerr-McGee Oil Industries, Inc. 1 State, Block 32, in the Ship Shoal area off Terrebonne Parish shore, is preparing to test shallow sands from 1,508 to 1,585 ft. Total depth is 1,742 ft. with 7-in. casing cemented to 1,728 ft. This test is reported to have a total of five different sands.

Magnolia Petroleum Co. 47 Cameron Meadow, off the southeast flank of Cameron Meadow field production, Cameron Parish, Section 28-14s-13w, flowed gas and condensate on an initial test, through perforations at 8,698-8,718 ft. Tubing was set on packer at 8,336 ft. and the well gaged 77 bbl. of condensate per day through a 7/64-in. choke with 3,550 psi. flowing pressure on tubing and a gas ratio of 11,026. Total depth is 8,850 ft.

The 16 new locations this week included two wildcat starts, one each in Calcasieu and St. Charles parishes.

SOUTH LOUISIANA SUCCESSFUL WILDCATS

Terrebonne Parish: New gas-condensate pay Four Isle dome—The Superior Oil Co. 2 State-LLE Unit 12, 24-21s-16e, top sand 13,455 ft., TD 14,220 ft., perf. 13,455-475 ft., IP: 180 bbl. condensate per day through a ¼-in. choke, gas-condensate ratio 30,555, TP 4,300 psi., gravity 48.4°, no water.

Vermilion Parish: New gas-condensate pay, Tigre Lagoon discovery area—Union Oil Co. of Calif. 1 Billeaud-Planters, 32-13s-5e, 3,000 ft. SW of 1 P. O. Landry discovery, 3½ mi. W of Avery Island field of Iberia Parish, TD 12,226 ft., top sand 11,638 ft., perf. 11,638-655 ft., IP: 50 bbl. condensate per day and 1,750,000 cu. ft. of gas per day through an 11/64-in. choke, TP 4,800 psi., gravity 50°, no water.

SOUTH LOUISIANA WILDCAT FAILURE

St. Martin Parish: Pure Oil Co. 1 New Iberia National Bank, in Section 2-

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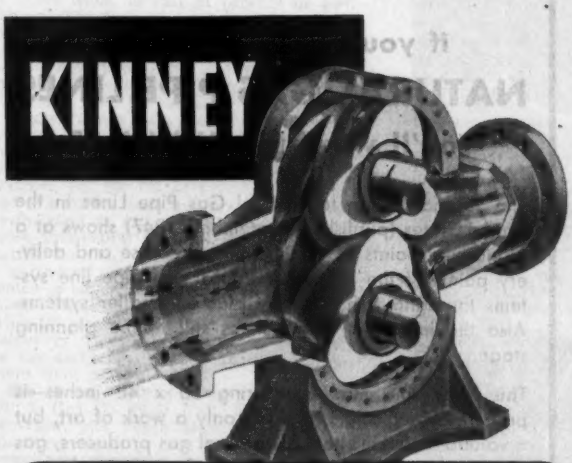

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N. CENTRAL TEXAS

New Pay Zone Found In Sherman Field

WICHITA FALLS.—A second pay zone in the Strawn section af the Pennsylvanian was discovered in the Sherman field of Grayson County last week when Standard Oil Co. of Texas 1 Rising, J. B. McAnair Survey, A-763, drilled plug on 7-in. casing at 3,217 ft., cleaned out and swabbed 60 bbl. of oil in 12 hours. Let stand 1 hour, it filled the hole 200 ft. with oil, and swabbing was resumed. The oil tested 35.6° gravity. Operators considered it a new pay level for the field since it produces from a sand some 500 ft. higher than the same operators' 1 Covey-Bates, first Strawn discovery in the field, and located 1,600 ft. east of 1 Rising.

Prospects of a conglomerate discovery 2 miles west of the Sanders field, Montague County, were dimmed when a second drill-stem test recovered mud. R. C. Lipscomb 1 C. McCall, Block 132, Belcher Subdivision, logged conglomerate oil showings from 5,878-5,890 ft., but a 20-minute test recovered 15 ft. of gas-cut mud and some 500 ft. of salt water. Further oil shows in samples were found from 6,004-12 ft., but a 1-hour drill-stem test of that interval recovered only 5 ft. of mud. Operators were deepening below 6,055 ft. on last report.

Continental Oil Co. 1 Hawkins, 4 miles southeast of Ringgold, Montague County, has production test scheduled around 4,100 ft. Pipe was being pulled to 4,200 ft., where it was to be perforated and squeezed for casing seat.

Another large producer was completed for Archer County last week at Southern Petroleum Exploration Co., Inc. and Charles E. Morrison 2 L. F. Wilson "D," located 8 miles north of Archer City, which rated a flowing potential of 1,512 bbl. daily. Top of sand was 3,848 ft., with first saturation from 3,872-94 ft. Operators ran electric log then drilled sand with a show of oil between 3,895-3,906 ft. After cleaning out, it was estimated good for 4 to 5 bbl. of oil an hour. Further sand shows were indicated to 3,992 ft., and the well was shot with 100 qt. between 3,906-22 ft., after which it was estimated good for 70 bbl. of oil an hour, and shut in for testing. When opened, it flowed 1,500 bbl. of 42°-gravity oil in 17 hours, through open casing, and on completion tests, it flowed 126 bbl. of oil in 2 hours through 14/64-in. choke. Casing pressure was 600 lb., tubing pressure 550 lb., and gas-oil ratio was 250.

Six miles south of Antelope, in the Ellis field of Jack County, Warren Oil Corp. 7 F. Richards, BBB&C Survey, A-29, completed for a daily potential of 1,157 bbl. of oil a day from the Caddo limestone at 4,684-4,705 ft. When cleaned out and acidized, it flowed 434 bbl. of 42°-gravity oil in 9 hours, through ¾-in. choke. Casing pressure was 950 lb., tubing pressure 320 lb., and gas-oil ratio was 1,130.

New locations in North Texas totaled 52 for the week. These were, by counties: Archer 10, Baylor 1, Clay 4, Cooke 8, King 1, Montague 2, Throckmorton 5, Wichita 13, Wilbarger 3, and Young 3. New locations for West Central Texas, by counties, were: Brown, 2 wildcats; Callahan 1, Coleman 2, Eastland 1, Fisher 1, Jones 11, Nolan 1, Palo Pinto 1, Shackelford 6, Stephens 5, and Taylor 3.

Oil field completions, by counties, were: Archer 6, Baylor 1, Cooke 2, Jack 3, Montague 1, Wichita 4, Young 4, Throckmorton 1, Taylor 1, Fisher 1, and Shackelford 1. These figures do not include dry holes.

NORTH TEXAS SUCCESSFUL WILDCAT

Archer County: Stewart & Grisham 1 J. F. O'Donohoe A, Blk. 104, ATNCL Sur., 9 mi. NW Archer City, perforated in limestone 3,762-70 ft., pumped 16.8 bbl. 39.8°-gravity oil a day, TD 5,163 ft.

NORTH TEXAS WILDCAT FAILURES

Archer County: Dawson & Barnes 1 J. D Powell, H. A. Allen Sur., A-3, 3 mi. E Archer City, dry, TD 1,392 ft. in sand and lime.

Timberlake & Kelleher 1 J. Conner, J. Tomlinson Sur., A-452, 3 mi. SW Anarene, dry, TD 1,164 ft.

Cooke County: B. F. Phillips 1 W. B. Hutson, J. Taylor Sur., A-1,023, 5 mi. NE St. Jo, dry, TD 4,187 ft.

King County: Ohio Oil Co. 2 S. B. Burnett, Sec. 2, S. Lazarus Sur., 6 mi. NE Guthrie, dry, TD 5,620 ft., Canyon Reef 4,725 ft.

Montague County: F. S. Reaser 1 T. R. Copland, Wm. Elliott Sur., A-225, 4 mi. NE Stoneburg, dry, TD 6,260 ft., Caddo 6,038 ft., conglomerate with stain 6,223-33 ft.

Wichita County: Ted A. Norwood 1 H. C. Obenhaus, MEP&P Sur., A-230, 6 mi. NE Electra, dry, TD 2,115 ft.

Young County: Timberlake & Kelleher 1 J. J. Darilek, 4½ mi. W Olney, dry, TD 1,308 ft. in shale, Gunsight limestone 1,262 ft.

WEST CENTRAL TEXAS SUCCESSFUL WILDCAT

Taylor County: Timpkins & Etheridge 1 Minnie Bowles, Sec. 27, BAL Sur., 4½ mi. NE Abilene, pumped 56 bbl. 38-gravity oil a day, some water, sand 1,844-46 ft., TD 1,846 ft.

WEST CENTRAL TEXAS WILDCAT FAILURES

Brown County: Mrs. C. H. DeBusk 1 C. T. Moore, Jesse Williams Sur. 144, 4 mi. S Crosscut, dry, TD 3,156 ft., Caddo

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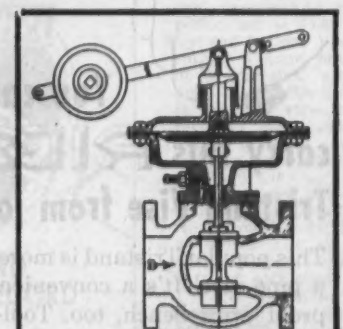

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2,100 ft., slight show oil 2,155-60 ft., Ellenburger 3,095 ft., sulfur water 3,150 ft.

Haskell County: McCarthy Oil & Gas Corp. 1-A Hendricks, Sec. 1, Blk. A, AB&M Sur., 14 mi. NE Leuders, dry, TD 5,320 ft., Caddo 4,716 ft., DST 4,437-47 ft. recovered oil-cut mud, Mississippi 5,027 ft., Ellenburger 5,225 ft., PB 4,450 ft., shot 4,420-40 ft., flowed estimated 15 bbl. oil a day, then decreased.

Shackelford County: Art Roch 1 Clauzell & Long, Sec. 576, TE&L Sur., 5 mi. NE Albany, dry, TD 851 ft. in shale.

Stephens County: Lloyd Oil Co. 1 George Dickie, G. Waggoner Sur., A-921, 5 mi. S. Woodson, dry, TD 4,842 ft., Caddo 3,749 ft., Mississippi 4,551 ft., Ellenburger 4,790 ft.

Star Oil Co. 1-A George Dickie, G. Waggoner Sur., A-921, NW corner of county, dry, TD 4,354 ft. in limestone, no tops reported.

ROCKY MOUNTAIN

Weston County Well Completed at 4,220 Ft.

DENVER.—Phillips Petroleum Co. 1 Weston, SW SE SE 8-44n-63w, Mush Creek field, Weston County, Wyoming, was completed at 4,220 ft., flowing 604 bbl. in 19 hours from the Newcastle (Muddy) sand, topped at 4,138 ft. The 5½-in. was set at 4,139 ft., and the ground elevation is 3,989 ft. Location is a northwest offset to Morton Oil Co. 1 Sedgwick, which was completed last August for 150 bbl. per day of 42°-gravity crude, extending the proven area 1½ miles to the west. It is a northeast offset to Morton's 1 Johnson, completed last month for 1,740 bbl. first 24 hours. The two last named wells set off a big lease play along the shore line trend on the west flank of the Blackhills uplift extending from Montana down into Niobrara County. Phillips-Morton 1 Torgeson, C SW SE 7-44n-63w, 1¼ miles to the northwest of these wells, is still in process of completion. The hole is caving and is cleaning out at 4,265 ft., 70 ft. off bottom. Phillips and Morton have spotted offsets close to the new producers, and it appears as though a race is on to recover migratory oil in the sand by intensive drilling.

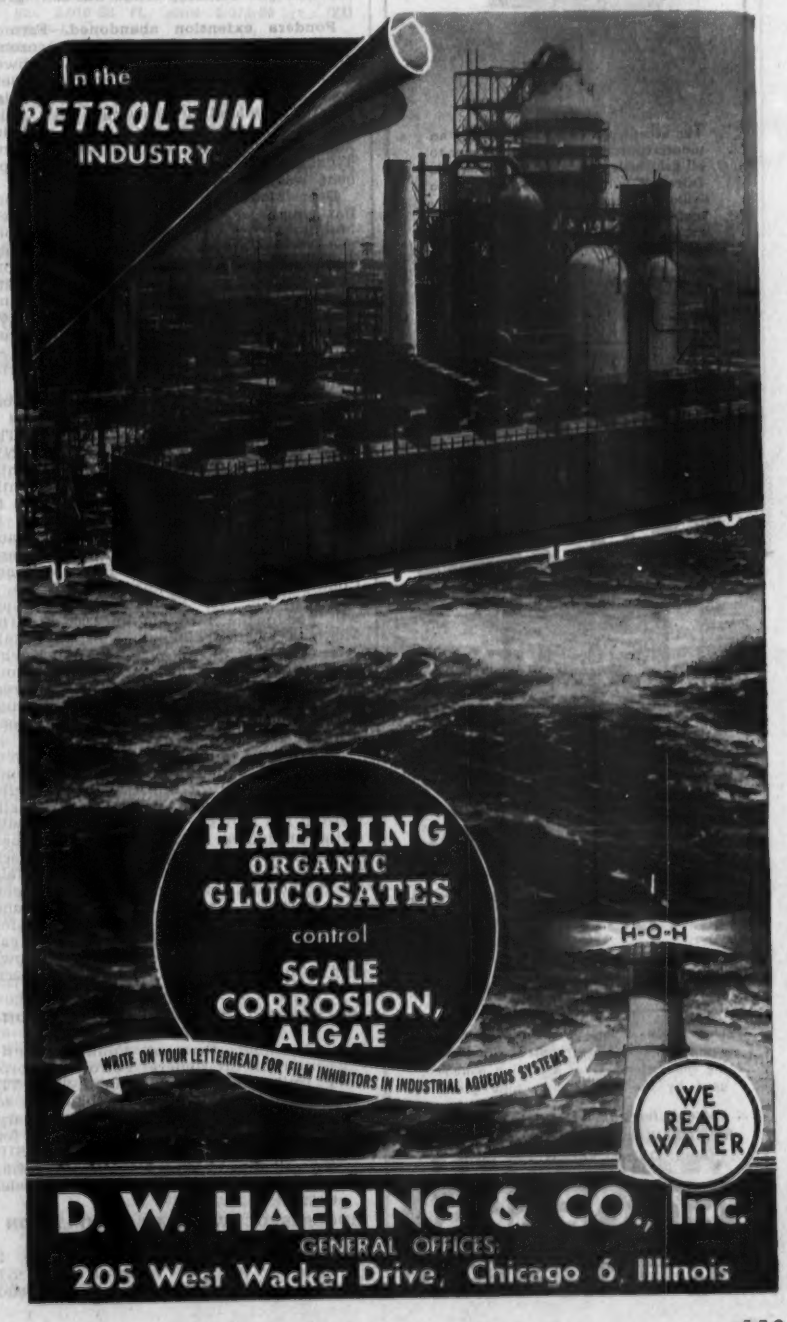
Fiddler Creek test.—Fifteen miles northwest of the Mush Creek operation and 5 miles west of the nearest producer in the old Osage field, the Clark Drilling Co. 1 O'Brien, SE SE SE 24-46n-65w, is drilling below 4,290 ft., and due to reach the Newcastle sand at around 4,500 ft. It will disclose interesting data on a geological situation now being intensely studied. It is a northwest offset to a well drilled in 1932 which produced some oil from the Newcastle sand at 4,498-4,500 ft. up to 1935 when it was plugged and abandoned. The discovery was made during the depression in the early 30s, and no further development took place.

Elk Basin Madison discovery.—Stanolind Oil & Gas Co. 38-M Unit, NE SE NE 24-58n-100w, Elk Basin field, Wyoming, the discovery well in the Madison lime last year, was reworked to bring its production up to 1,000 bbl. per day in accordance with a recent agreement among the operators. It was completed last December for 247 bbl. of 30.2°-gravity oil in 24 hours through a ⅝-in. choke. This production was from the lower part of the sand. The upper section was shut off with 5½-in. liner set at 4,680 ft. Top of the Madison was at 4,340 ft. The casing was perforated with 942 shots between 4,400 and 4,632 ft., and after acidizing, flowed an average of 32 bbl. per hour, or at the rate of 768 bbl. per day, through a ¾-in. choke on final test before putting it back on production. The 95 Unit well 2 miles to the south, a second test to the Madison, is near completion at 5,941 ft., total depth. Last gage reported it flowed 38 bbl. per hour wide open through the 2½-in. tubing, showing 1.4 per cent water and 1.3 per cent b.s. It is still testing. It had 908 ft. of water-free Madison, but not oil saturated all the way to the bottom. It cut 198 ft. of good saturation.

Hatfield Tensleep discovery.—Rocky Mountain Gas Co. 1 Government, NE SE NW 2-19n-88w, Carbon County, Wyoming, is being completed in the Tensleep at 5,805-6,072 ft. After a shot with 91 quarts, it flowed 11 bbl. per hour during the first hour and then increased to 15 bbl. per hour. It is still testing. This was a small gas field producing principally from the Muddy sand which was discovered in 1923. Five wells were drilled, the deepest going to the red beds. Some production was found in the Frontier and Dakota, but the field is now about depleted. The discovery is in one of the old wells deepened from 4,676 ft. The gravity of the crude is 43° and from 5 to 10 degrees higher than from the Tensleep in nearby pools. Ohio Oil Co. is moving in for 2 Union Pacific, C SW SE 35-30n-88w, ½ mile to the north of the discovery.

South Elk Basin.—Continental Oil Co. 9 Ida Goodstein, NE NW SE 20-57n-99w, South Elk Basin field, an outpost on the east side of the field, was completed at 7,022 ft. for a potential of 360 bbl. per day, based on swabbing test, from the Tensleep, top at 6,956 ft. Continental brought in the discovery well in 1945. Since then development has proceeded mostly on a north-south trend. Two wells completed on the west side were both good producers. The 9 Goldstein was the first outpost on the east side. It found the top of the Tensleep approximately 25 ft. higher structurally than in the discovery, nearly ½ mile to the southwest, but 68 ft. lower than No. 6 on the west.

Elk Springs extension.—Continental Oil Co. 2 Margaret Smith, SW NW NE 30-5n-98w, Elk Springs area, Moffat County, Col-



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orado, ⅛ mile northeast of the discovery, and 91 ft. structurally higher on the Weber sand is swabbing to test at 6,338 ft. While swabbing dead oil, run to displace the mud, live oil rose 1,000 ft. in 2 hours.

Worland field extended.—Pure Oil Co. 6 Unit, NE NE NW 19-48n-92w, Worland field, Washakie County, Wyoming, was completed in the Embar at 10,440 ft., plugged back from 10,720 ft., for 771 bbl. first 24 hours. On last gage it was making 35 bbl. per hour, or at the rate of 840 bbl. per day. Top of the Embar was at 10,268 ft., and ground elevation 4,040 ft. Its location is 1 mile due south of the discovery, and ¾ mile southwest of 3 Unit, which up to this completion was the best well in the field. The oil is 35° gravity. Structurally, it is approximately 200 ft. lower than 3 Unit. This well had a show in the Tensleep, top at 10,543 ft., estimated at 90 bbl. per day, the first well in the basin structures to find saturation in that horizon. The Tensleep crude was 22.7° gravity.

Pondera extension abandoned.—Farmers Union Central Exchange 1 Mancoronel, NW NW NW 6-27n-4w, 2 miles northwest of nearest producer in the Pondera field, reported a completion for 120 bbl. last month estimated on swabbing test, failed to come up to expectations after acidizing and putting on the pump. It pumped only 9 gal. of fluid per hour, of which 50 per cent was water.

Deer Mountain test.—Topside Oil Corp. has started a cable-tool venture on Deer Mountain structure in Routt County, Colorado. Possible production in this area comes from Mancos fissures, Frontier, Dakota, Muddy, Lakota, Morrison, Sundance, and Weber or Arkose at approximately a final depth of 3,000 ft. The corporation has 3,500 acres covering this and an adjacent structure.

New operations.—Twenty-one new operations were reported, of which 4 were in Colorado, 5 in Wyoming, and 12 in Montana. The Colorado locations included 3 in the Rangely field, and one wildcat. The latter is Carter Oil Co. 2 Unit, C NW NW 23-8n-91w, North Craig, Moffat County, 3¼ miles northwest of its 1 Unit recently abandoned in the Mancos shale at 9,000 ft. The Wyoming locations included one in the Hatfield field, 3 in Mush Creek, and a wildcat at Heart Mountain, on the western rim of the Big Horn Basin in Park County. The latter is Trigood Oil Co. 1 Taggart, NW SW SW 8-54n-102w which will go to the Frontier at 2,000 ft. The Montana locations include 5 in Cut Bank, 2 in Bowdoin, 1 in Mosser, 3 in Kevin-Sunburst, and 1 wildcat in Luhman 2 Dunbar, SE NE NE 11-2n-1w, Dunbar area, Jefferson County, 2 miles east of 1 Dunbar, recently abandoned in igneous rock at 1,260 ft.

Completions.—Nineteen completions were reported, of which 10 had initial production of 2,453 bbl. of oil, 6 were gas wells, and 3 were dry holes. Two of the oil wells were in the Rangely field in Colorado, with initial production of 383 bbl. Wyoming had 5 oil wells for 1,858 bbl. of which 1 each were in Frannie, Worland, Little Buffalo Basin Mush Creek, and South Elk Basin. Two were gas wells in East Antelope and Torchlight. Montana had 3 oil wells for 212 bbl., all in Kevin-Sunburst, one gas well each in East Keith, Cut Bank, Bowdoin, and Hardin, and 3 dry holes, 1 each in Dunbar, Pondera and Cat Creek.

SUCCESSFUL WILDCAT COMPLETION IN WYOMING

East Antelope, Fremont County: Continental Oil Co.-General Petroleum Corp. 1 Unit, NW NW SE 26-27n-93w, TD 6,610 ft., in top of Steele shale, PB to 2,300 ft. and completed in Tertiary through perf. at 2,157-2,180 ft. for 8,900,000 cu. ft. of gas per day, SIP 900 psi. Elev. 7 149 gr. Ft. Union, 2,670; Lewis, 5,043; Mesa Verde, 5,917; Steele, 6,532 ft.

SUCCESSFUL WILDCAT COMPLETION IN MONTANA

East Keith, Liberty County: Texas Co. 1 Colby, C SW NW 13-36n-6e, TD 4,977 ft., completed in lower Colorado through perf. at 2,820-3,045 ft. for 9,000,000 cu. ft. sweet gas. Colorado, 595; Kootenai, 2,275; Madison, 3,005; Three Forks 3,775; Potlash, 3,835; Jefferson, 3,963, ground elev. 3,450 ft.

WILDCAT FAILURE IN MONTANA

Dunbar, Jefferson County: Luhman 1 Dunbar, C NW NW 8-2n-1w, TD 1,260 ft. in igneous rock, top of Ellis, 776 ft.

OKLAHOMA

Second West Shawnee Lake Well Hits Pay

IN east central Oklahoma, confirmation well of West Shawnee Lake pool, Deep Rock Oil Corp. 2 Black, NW SE NW 17-10n-2e, flowed oil on drill-stem test of first Wilcox sand. Test at 6,011-21 ft. showed gas in 5 minutes and flowed an estimated 10 bbl. of oil to pits in 13 minutes. Coring ahead from 6,021-31 ft. recovered 10 ft. of good-saturated sand, and a second core at 6,031-41 ft. recovered 3½ ft. including 3 ft. of saturated sand and 6 in. of white sand. Operators will drill ahead to second Wilcox. Discovery well of the pool, Deep Rock 1 Black, was completed in the first Wilcox without digging ahead to the second. Deep Rock is drilling ahead at two additional offsets; 1 Chandler, NW NE SW 17-10n-2e, and 1 Childers, NW NW SE, same section.

A new pool has been opened in Shell Creek Lake area of southern Osage County by O. E. Dempsey 1 Osage, SE SE NE 15-20n-10, 6 miles northwest of Sand Springs. This test flowed an estimated 150 bbl. of oil per day and 7,125 M.c.f. of gas. Sands cut included Oswego at 1,611 ft., Pink line at 1,867-74 ft., Bartlesville at 1,995-2,122 ft., and Tucker at 2,173 ft. Dempsey has 480 acres around the discovery.

Carter Oil Co. 1 J. J. Harrison, extension well to East Lindsay pool, McClain County, flowed 29 bbl. of oil in 3 hours, died, and then crews swabbed 83 bbl. in 21 hours from plugback depth of 9,997 ft. Well is in C SW SW 31-5n-3w.

Gulf Oil Corp. 1 Joe, SW NW SE 4-10n-7e, Seminole County wildcat north of Sylvian area, had a show of gas on 1-hour drill-stem test at 3,697-3,710 ft. Gas showed in 4 minutes and by end of test reached an estimated 1,000 M.c.f. daily. Recovery was 540 ft. of salt water and trace of oil.

Ohio Oil Co. 4 Woods, NW SW NE 17-3n-5w, Knowx pool, Grady County, had favorable drill-stem test at 4,267-94 ft. Gas flowed in 12 minutes and recovery, after operations were shut down overnight, was 500 ft. of oil and 2,000 ft. of muddy oil.

Five of the state's counties—Cotton, Garvin, Logan, Stephens, and Carter—accounted for 45 of the 87 new locations made during the week. Totals for the five leaders were 12, 12, 8. 7, and 6 respectively. Completions totaling 73 were scattered among 25 counties with Cotton, Texas, Hughes, and Caddo the leaders. Cotton County had three wildcat starts, and Lincoln and Pottawatomie two each.

OKLAHOMA SUCCESSFUL WILDCATS

Garvin County: Cities Service 1 Biffle, NW SW NE 23-3n-2w, flowed 66 bbl. of distillate per day, 50° gravity from sand at 5,424-45 ft. through ¾-in. tubing choke, TD 6,562 ft.

Harper County: Huber 1 Heironymus, C NW SE 3-26n-24w, produced 700,000 cu. ft. gas from sand at 5,343-42 ft., TD 7,007 ft.

Logan County: Woods 1 Crabtree, NW NE NW 4-16n-1e, flowed 713 bbl. of 38°-gravity oil per day from second Wilcox at 5,238-60 ft., TD 3,246 ft.

McClain County: Sinclair 1 McDaniel, C SE SE 35-5n-4w, flowed 410 bbl. of distillate per day, 51.3° gravity, from Bromide sand at 10,524-76 ft., TD 11,262 ft.

(Continued on page 162)

APPALACHIAN FIELD

Durr Wildcat Topped Tully Lime at 4,136 Ft.

PITTSBURGH.—In Garrett County, Maryland, on the Deer Park anticline, Columbian Carbon Co. topped the Tully lime at 4,136 ft. in the important wildcat on Willis J. Durr farm and is now drilling at 4,350 ft. in limy shale.

On Chestnut Ridge in Georges Township, Fayette County, southwest Pennsylvania, New Penn Development Co. et al topped the Onondaga chert at 7,147 ft. in the second test on Mary I. Smith tract which from a surface elevation of 2,390 ft. places it minus 4,757 compared with 4,562 ft. in the No. 1 which is the largest gas well completed on the structure and which, after a full year in the line, is still feeding 5,000,000 cu. ft.

In Cumberland Township, Green County, Manufacturers Light & Heat Co. completed No. 2 Thomas Patterson good for 2,000,000 cu. ft. gas with the Big Injun sand 1,360 ft., gas 1,712 ft., 1,722 ft. and 1,725 ft., Bayard sand 2,822 ft., gas 2,825-27 ft., total depth 2,827 ft.

In Nuttall district, Fayette County, West Virginia, Columbian Carbon Co. topped the Corniferous lime at 7,115 ft., steel line measurement, in the important Oriskany wildcat on Franklin Real Estate Co. which from a derrick floor elevation of 2,344 ft., places that member minus 4,771 ft.

In Ripley district, Jackson County, United Fuel Gas Co. topped the Corniferous lime at 4,638 ft. from a surface elevation of 636 ft. in the test 6,218 W. H. Bourgeois and set 7-in. at 4,653 ft. Here, the West Virginia Gas Corp. topped the Corniferous at 4,812 ft. from a surface elevation of 685 ft. in the test 547 J. A. Taggart.

New locations in West Virginia totaled 18 and in Crook district, Boone County; Birch and Otter districts, Braxton County; Clay district, Hancock County; Ravenswood district, Jackson County; Elk district, Kanawha County; Harts Creek, Jefferson, Laurel Hill and Sheridan districts, Lincoln County; Kermit district, Mingo County; Grant district, Nicholas County; Clear Fork and Trap Hill districts, Raleigh County; Clay, Grant & Murphy districts, Ritchie County.

WEST VIRGINIA SUCCESSFUL WILDCATS

Gilmer County, DeKalb district: C. T. Belknap 1 Cora N. Smith, 539,000 cu. ft. gas, Injun sand, TD 1,910 ft.

Jackson County, Ripley district: United Fuel Gas Co. 6,214 L. E. Wetzell, 1,057,000 cu. ft. gas, elev. 715 ft., Corniferous lime 4,676 ft., Oriskany 4,780 ft., gas 4,780-82 ft., shot 4,775-4,827 ft., rock pressure 830 psi., TD 4,827 ft.

Raleigh County, Trap Hill district: Hope Natural Gas Co. 9,164 H. G. Farmer, 300,000 cu. ft. gas after shot; Ravencliff sand 1,599-1,639 ft., Maxton 2,039-95 ft., TD 2,104 ft.

Hope Natural Gas Co. 9,165 Thomas G. Farmer, 300,000 cu. ft. gas, Ravencliff sand 1,520-66 ft., Maxton 2,014-49 ft., gas 2,016-28 ft., shot 2,014-30 ft., TD 2,049 ft.

Roane County, Harper district: Field & Crews 1 Earl Hawkins, 6 bbl. and 50,000 cu. ft., gas, Salt sand, TD 1,500 ft.

WEST VIRGINIA WILDCAT FAILURE

Putnam County, Union district: Godfrey L. Cabot, Inc., 1,250 J. L. McLean Hrs., dry, salt water, elev. 963 ft., Corniferous lime 4,942 ft., Oriskany 5,041-81 ft., TD 5,090 ft.

LEGAL

Bureau of Land Management, Washington, D. C. Notice is hereby given that sealed bids will be received until 1 p.m., Wednesday, **November 19, 1947**, for the SE¼SE¼ sec. 10, T. 28 S., R. 28 E., M.D.M., 40 acres, situated within the known geologic structure of the Mon Bluff Field, California. This land is offered to qualified bidders of the highest cash amount per acre as a bonus for the privilege of leasing the land under section 17 of the leasing act of February 25, 1920 (41 Stat. 437, 30 U.S.C. sec. 181) as amended. Royalties payable to the United States will be at the rate of 12½ per cent to 25 per cent for oil, and 12½ per cent to 16⅔ per cent for gas, in accordance with Schedule B in the lease form. All bids must be submitted to the Director, Bureau of Land Management, Washington 25, D. C., and each bidder must submit with the bid one-fifth of the amount bid in cash, or by certified check on a solvent bank, or by money order, made payable to the order of the Treasurer of the United States, and file the showing of qualifications to receive a lease, required under 43 CFR 192.42(b) and (c). The envelopes should be plainly marked, "Bid for lease, Mon Bluff Field, California. Not to be opened before 1 p.m., **November 19, 1947.**" No bids received after the hour fixed herein for submitting bids will be considered. The remainder of the bonus and the annual rental at the rate of $1 per acre must be paid and a corporate surety bond in the sum of $1,000 must be furnished by a successful bidder prior to the issuance of a lease. A $5,000 corporate surety bond will be required prior to commencing drilling operations on the land. The deposits of the other bidders will be returned upon acceptance of the successful bid. Bidders are warned against violation of section 59, U. S. Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids. Fred W. Johnson, Director.

MISSISSIPPI

Potential Field Discovery In Franklin County

JACKSON.—J. C. Hawkins 1 Lehmann, potential new field discovery in Franklin County, is now flowing 7½ bbl. of fluid per hour through a 3/16-in. tubing choke with top pressure of 475 to 550 psi. Estimated salt water is 15 to 20 per cent. A drill-stem test after the squeeze job last week was dry, and operators reperforated from 10,550-10,552 ft. First salt water was noted after the well had been flowing to tank for 10 hours. Intermittent slugs of salt water along with clean oil have continued during the following 48 hours of testing, with top pressure declining from a maximum of 775 to 300 psi.

At Ovett, Jones County, Gulf Refining Co. 1 L. L. Majors, 29-6n-11w, is pulling test tool following drill-stem test of four perforated zones in an over-all interval from 12,095 to 12,288 ft. This test filled up with oil and flowed a small amount by heads while being agitated with swab.

In the Brownsville area, Hinds County, Gulf 1 W. H. Trotter, 15-7n-2w, is drilling below 5,912 ft. in anhydrite and black silty shale.

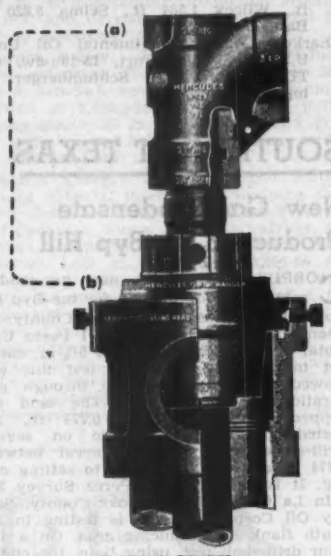
At Sandersville Jones County, Union Sulphur Co. 1 Earline Parker, 31-10n-10w, has been perforated in the upper portion of the Christmas sand at 5,702-5,714 ft. The well had been pumping an average of 12 to 15 bbl. of 11.5°-gravity oil per day with 25 to 30 per cent salt water since its completion. The Christmas sand was perforated in hope of supplementing this production but thus far tests have recovered approximately 200 bbl. of salt water with only a show of oil.

The 4 new locations reported this week are in proven areas, 1 in La Grange field, Adams County, and 3 in Mallalieu field, Lincoln County. The 3 wildcats completed were dry, 1 in Clarke and 2 in Sharkey counties.

MISSISSIPPI WILDCAT FAILURES

Clarke County: Stanolind Oil & Gas Co. 1 W. C. Couch, NW NW 20-2n-18e, dry, TD 5,626 ft. Top Eutaw 3,868 ft., Tuscaloosa 4,326 ft., Marine Tuscaloosa 5,112 ft., Massive sand 5,392 ft., Comanche 5,584 ft.

Sharkey County: Harold K. Boysen 1 A. Y.



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Keith, NW SE 10-13n-5w, dry, TD 4,500 ft., Wilcox 1,584 ft., Selma 3,820 ft., Base chalk 3,958 ft.

Sharkey County: Continental Oil Co. 1 U.S.D.A.-Spanish Fort, 13-10n-6w, dry, TD 4,815 ft., Ran Schlumberger. No tops available.

SOUTHWEST TEXAS

New Gas-Condensate Production for Byp Hill

CORPUS CHRISTI.—A new gas-condensate producing horizon for the Byp Hill dome in northeastern Brooks County has been opened by Sun Oil Co. 1 Perez Unit. Total depth is 7,162 ft. with 5½-in. casing set to 6,913 ft. On initial test this well flowed gas and condensate through perforations at 6,790-6,810 ft. The sand was topped at approximately 6,774 ft., and tested gas and condensate on several drill-stem tests in the interval between 6,774 ft. and 6,830 ft., prior to setting casing. It is located in S. Perez Survey 334.

In La Gloria field, Brooks County, Sunray Oil Corp. 1 Peeples is testing in the south flank oil producing area. On a 4½-hour drill-stem test, using ½-in. top choke, through perforations at 6,767-72 ft., it flowed 8 bbl. of oil per hour with 2,000 psi. working pressure, gas-oil ratio 2,037 at beginning of the test; and at end of test recovery was approximately 6 bbl. per hour with 2,100 psi. working pressure and gas-oil ratio of 3,274. Bottom-hole pressure was 3,450 psi. open and 3,550 psi. closed. The perforations were squeezed and the sand will be reperforated for a new test. If an oil producer results at this level, it will be a new oil pay zone for the field.

Humble Oil & Refining Co. is waiting on potential gage at the 1 Nicholson, wildcat located 12 miles west-northwest of Lopez field, in Webb County. On initial test through perforations at 5,574-77 ft., swabbed 100 per cent oil, and flowed clean oil through a ⅛-in. choke, with 125 psi. tubing pressure.

There were 38 new locations reported this week with 18 being wildcat starts, 4 in McMullen, 2 each in Edwards, La Salle, and Williamson, and 1 each in Atascosa, Duval, Guadalupe, Jim Hogg, Medina, San Patricio, Starr, and Webb counties. Three new oil pools were opened this week, 1 each in Atascosa, Edwards and Hidalgo counties.

SOUTHWEST TEXAS SUCCESSFUL WILDCATS

Atascosa County: New oil pool, East Imogene—Humble 1 Nelle, Gordon & C. G. Dinsmoore, Tract 1, BBB&C Sur. 1060, 6½ mi. SE of Pleasanton, 5 mi. E of Imogene field, TD 8,124 ft., perf. 8,093-8,104 ft., IP: 3 bbl. oil per day through a 3/16-in. choke, gas-oil ratio 3,095, TP 30 psi., CP 170 psi., gravity 35°, 0.3 per cent water.

Edwards County: New oil discovery—Babb & Dillard 1 L. J. Wardlaw, Sec. 7, GC&SF RR Sur. flk F., 14 mi. from north line and 8 mi. from west line of county, top pay 237 ft., TD 248 ft., open hole 60-248 ft., IP: 25 bbl. oil per day on pump, no gas, gravity 18°, no water.

Hidalgo County: New oil pool—Coastal Refineries, Inc. and M. L. Massingill 1-A Garcia Land & Livestock Co., in Doss area in Porcion 43, 1 mi. NE of Texas Co. 1 Doss gas discovery, 6 mi. N-NE of Sullivan City and 5 mi. NW of Samfordyce, top pay 4,000 ft., TD 5,368 ft., perf. 4,020-23 ft., IP: 50 bbl. oil per day through a 9/64-in. choke (net oil), gas-oil ratio 750, TP 1,050 psi., CP 1,480 psi., gravity 38°, 25 per cent water.

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SOUTHWEST TEXAS WILDCAT FAILURES

Atascosa County: Eugene W. Gill 1 Lawrence Katcmorak, in Blancy Meyer Sur. 1291, 2½ mi. NW of Leming, dry, TD 4,168 ft.

Bastrop County: H. F. Burkhart 1 A. H. Carter, in James Standifer Sur., 3 mi. SW of Elgin, dry, TD 2,730 ft.

Otto A. Wolter 1 W. A. Boggen, in James Standifer Sur., 4½ mi. SW of Elgin townsite, dry, TD 350 ft.

Dimmit County: Rodney Delange and Milam Drlg. Co. 1 Walter Herbst, Sec. 12, Good Luck Colony subd., Sur. 2, 2½ mi. E of Valley Wells, dry, TD 5,502 ft.

Edwards County: Babb & Dillard 2 L. J. Wardlaw, GC&SF RR Co. Sur. 8, dry, TD 500 ft.

Brown & Wilborn 1 Eastland, GC&SF Sur. 119, 15 mi. from north line of Edwards County, dry, TD 460 ft.

Hidalgo County: Sun Oil Co. 1 D. V. Guerra et al, in San Salvador del Tule Grant, 2 mi. NE of San Manuel, dry, TD 11,001 ft.

McMullen County: Newman Bros. Drlg. Co. and Skinner & Eddy Corp. 3-AA South Texas Syndicate, in BS&F Sur. 21, 2 mi. NE of Green's Branch field, dry, TD 3,992 ft., no shows in Queen City or Carrizo sands.

Nueces County: Selby-Walker Corp. 1 Arthur Merritt, in Casa Blanca Grant, 4½ mi. NE of Richard King field and 5 mi. NW of Agua Dulce field, dry, TD 6,302 ft.

San Patricio County: Producers Corp. of Nevada 1 Bertha McClary, in Lot 8, Fourth Addn. of Taft Farm Lands, 12 mi. NE of Taft, dry, TD 6,519 ft.

Starr County: Sun Oil Co. 5-B Isabel V. Montalvo, in Los Retachez Grant, 1 mi. SE of North Sun field, dry, TD 5,006 ft.

Val Verde County: Chas. A. Maurer 1 John W. Ingram, in EL&RR Ry. Co. Sur. 33, 9 mi. NE of Langtry, ½ mi. S of Pecos River, dry, TD 2,080 ft.

Webb County: George Buck and J. N. Abel 2-C J. G. Garcia Hrs., Sur. 592, 1½ mi. E of Mirando City, dry, TD 1,906 ft.

F. B. Lefevre et al 1 Amalia G. de Ortis et al, in Los Ojuelos Grant, 3 mi. SE of Mirando City, dry, TD 1,874 ft.

Massingill & DeLange 1 Dr. Raul de la Garza, in G. G. de la Garza Sur. 262, 9 mi. N-NE of Oilton, dry, TD 2,300 ft.

KANSAS

Bennett & Roberts Open Pool in Barton County

A NEW pool 1½ miles east of Kraft-Prusa pool has been opened by Bennett & Roberts, Inc., 1 Esfeld, SE SE NW 15-16-11w, Barton County. The well made an estimated 100 bbl. of oil per day, after light acid treatment, from Arbuckle lime which was topped at 3,343 ft. Bennett & Roberts et al are drilling another well on the west side of Kraft-Prusa pool, the 1 Oeser, SE SE SW 30-16-11w.

Continental Oil Co. has what looks like a pool opener 3 miles northwest of Zurich and 3½ miles southwest of McClellan pool, Rooks County. The 1 Eva Gick, NE NW NE 30-9-19, swabbed 240 bbl. of oil in 24 hours from total depth of 3,586 ft. in Arbuckle pay.

Frank Dieter and Saco Oil Co. 1 Navrat, NE NE SW 16-18-4e, a wildcat 2½ miles south of Lost Springs pool, Marion County, is testing 100 bbl. of oil per day from Mississippi. Mississippi was topped at 2,406 ft., small show of oil registered from 2,427-37 ft., and total depth reached at 2,444 ft. Operators hold 2,000 acres around the successful wildcat.

Another new Mississippi pool has been opened by Red and Morris with their 1 Robinson, 1 mile north of Allen pool, western Butler County. The 1 Robinson, NW NE NW 36-25-3e, was completed for 25 bbl. from total depth of 2,723 ft. Same operators

are starting a northeast offset, 1 Lambing, SE SE SW 25-25-3e.

Barton, Ellis, Stafford, Butler, Grant, and Rooks counties accounted for 40 of the state's 61 new locations during the week. These same counties, with the addition of Kearny led the state in completions, accounting for 42 of the state's total of 66. Fourteen new wildcats were staked during the week with three of them in Graham County.

KANSAS SUCCESSFUL WILDCATS

Butler County: Rex & Morris 1 Robinson, NW NE NW 36-25s-3e, produced 25 bbl. of 42°-gravity oil per day from Mississippian at 2,708-23 ft.; Lansing 1,935 ft., Kansas City 2,230 ft., TD 2,723 ft.

Rooks County: Continental 1 Finnesy Unit, SE SE NE 14-10s-18w, pumped 26 bbl. of oil per day from Lansing-Kansas City at 3,542-58 ft.; Lansing 3,382 ft., Arbuckle 3,753-59 ft. with stain of oil, TD 3,763 ft.

Stafford County: Stanolind 1 Otto Pundsack, SE SE SW 19-21s-13w, pumped 89 bbl. of 27°-gravity oil per day from Arbuckle at 3,736-43 ft.; anhydrite 814 ft., brown lime 3,374 ft., Lansing-Kansas City 3,385 ft., conglomerate 3,624 ft., Simpson 3,680 ft., TD 3,743 ft.

KANSAS WILDCAT FAILURES

Butler County: Barnsdall Oil Co. 1 Hess, SW SE 26-25s-6e, dry, TD 2,680 ft., sandy shale 2,622-58 ft., Bartlesville sand 2,658-80 ft.

Pratt County: Harbar & Lion Oil 1 Mardis, NW NW NE 35-26s-12w, dry, TD 4,545 ft., brown lime 3,662 ft., Lansing-Kansas City 3,673 ft., Mississippian 4,130 ft., Viola 4,316 ft., Simpson 4,414 ft., Arbuckle 4,490 ft.

MISSOURI WILDCAT FAILURE

Gentry County: J. E. Palensky 1 Slagle, NW NW SE 13-64n-33w, dry, TD 1,601 ft., basal Hertha 390 ft., Mississippi lime 1,154 ft., Hunton 1,590 ft.

CANADIAN FIELDS

New Leduc Well Makes Good Showing

CHATHAM.—In the Leduc field, Leduc Consolidated 2, LSD 15, 23-50-26w4, is continuing tests at 5,359 ft. with indications that it will be the third independent producer. Finished close to the water line, it is making 90 bbl. a day on 9/64-in. choke, increasing to 120 bbl. on 10/64-in. choke. Tests indicate steady bottom-hole pressure, and oil continues water free.

Globe-Leduc West 1, LSD 6, 10-50-26w4, testing at 5,104 ft. with early indications of a large well, is being placed in production. Globe-Leduc West 2, LSD 9, 34-50-26w4, finished at 5,285 ft., has been producing 350 to 400 bbl. through ¼-in. choke, with increasing pressure. These wells are 4 miles apart. Globe-Leduc West 3, LSD 10, 34-50-26w4, offsetting No. 2, is coring below 3,449 ft.

Homestead-Yaremko 1, LSD 7, 19-50-25w4, east of the field, has been abandoned at 5,365 ft. East Leduc 1, LSD 3, 9-50-26w4, cored the first porous zone at 4,569 ft. and will be an early completion.

Among recent Imperial completions, Imperial 11, LSD 9, 21-50-26w4, continuing tests at 5,115 ft. made 86 bbl. in 16 hours on 5/32-in. choke. Imperial 14, LSD 9, 26-50-26w4, made 269 bbl. on 3/16-in. and 146 bbl. on 5/32-in. choke. Five other Imperial tests are drilling, with derrick up for Imperial 20 in LSD 8, 34-50-26w4, and Imperial 24 located, in LSD 12, 35-50-26w4.

Atlantic Oils 1, LSD 13, 23-50-26w4, is below 2,210 ft. and Home-Leduc 1, LSD 11, 21-50-26w4, has spudded.

South and east of the field, Millet-Leduc 16-6, LSD 16, 6-48-24w4, passed from argillaceous to brown lime at 6,015 ft. and had taken several cores with no pronounced evidence of porosity.

Keystone Valley.—On the Keystone Valley structure in the central Alberta foothills, Roxana 4-K, LSD 8, 31-27-4w5, topped the Fernie limestone at 10,460 ft. and is nearing the Madison limestone below 10,533 ft. With heavy pressure of drilling mud at the bottom, some gas is forcing itself to the surface. The structure is part of the foothills system on which the Turner Valley field is located.

Steveville.—In the Steveville-Princess field, Pacific Petroleums 24-P, LSD 9, 7-19-11w4, is testing the top of the Madison limestone at 3,318-24 ft. with indications of commercial production. Rig will be moved for Pacific 25-P, NW 10, 8-19-11w4, another Madison test. Empire Pacific 2, LSD 16, 22-19-12w4, has acidized at 3,314-18 ft. A previous production of 50 bbl. of 25°-gravity oil with a similar amount of water has been increased to 150 bbl. of each and plug has been set to shut off water. Federal Oils 1, LSD 7, 8-19-11w4, bottoming at 3,376 ft., is maintaining production around 100 bbl. and derrick is up for Federal 2, LSD 8, 8-19-11w4, an east offset.

Turner Valley.—In the Turner Valley north extension Foothills Oil & Gas 26, LSD 2, 9-21-3w5, east flank well, is testing Madison at 8,430-9,227 ft. with good indications. Home Oil 29, LSD 2, 33-20-3w5, got the Madison at 7,676 ft. Four other wells are drilling, with two locations.

Central Plains.—In the Central Plains area of Alberta, three wells, outlying the Leduc field, are nearing the decisive stage. Gulf-Canadian Stony Plain 1, LSD 14, 9-52-26w4, due north, got the Devonian limestone at 4,459 ft., a core at 4,466-86 ft. showing oil and gas traces but poor porosity. An earlier 13-ft. core showed 4 ft. of gas and oil at bottom, with water above. In the Camrose area, south and east of Leduc, Camrose 1, LSD 9, 29-46-20w4, is below 5,090 ft. and coring. North and west of Leduc, Wabamum Lake 1, LSD 5, 10-51-4w5, is below 5,101 ft.

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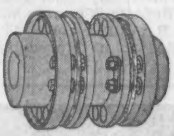
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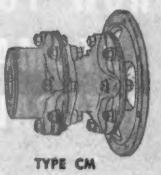
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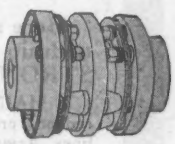
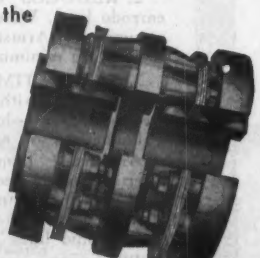

TYPE DBZ-B

In the Laboratory Thomas "Flexible" Dynamometer Couplings assure the greatest accuracy.


TYPE DBZ

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Coll-Union 6-D, LSD 6, 17-5-5w4, finished at 2,770 ft. with 28,000,000 cu. ft. gas from the Bow Island sand. This gives the joint drilling program a total of 12 gassers averaging 30,000,000 cu. ft. per day open flow. At Pinhorn, McColl-Union 5-17, LSD 5, 17-1-3w4, is testing at 2,188 ft.

TEXAS GULF COAST

South Hutchins Field Gets ¾-Mile Extension

HOUSTON.—A new sand discovery and a ¾-mile southwest extension at South Hutchins field in Wharton County has been completed by McDannald Oil Co. The 6 K. C. Martin in I&GN Survey 16, was drilled to a total depth of 6,015 ft., and pipe was perforated in a 2-ft. section from 5,895-98 ft. The well gaged 192 bbl. of 30°-gravity pipe-line oil daily through a ⅛-in. choke. Flowing pressure on tubing was 950 psi., and 2,200 psi. casing pressure. Operators expect to get a discovery allowable for the new producer.

Hawkins & Graham, Inc. have opened new oil production off the west-southwest flank of the Batson dome in Hardin County. The 1 C. G. Hooks et al, in F. H. Green Survey, Lot 5, topped oil saturation at 5,392 ft. and was still in saturated oil sands at a total depth of 5,534 ft. An initial test through perforations at 5,400-10 ft. flowed at the rate of 156 bbl. of 40°-gravity oil daily through a ⅛-in. choke, with 520 psi. working pressure. Production is from the Cockfield-Yegua section.

A new pay zone for Bonnie View field in Refugio County has been opened by P. R. Rutherford 14 Henry Schirmer. Drilled to a total depth of 6,430 ft., with 5½-in. casing set at 6,261 ft., this well flowed 65 bbl. of condensate and 29,965,000 cu. ft. of gas per day through a ¼-in. choke, with 2,120 psi. tubing pressure, shut-in pressure 2,190 psi. Production is through perforations at 5,632-36 ft. Gas-condensate was tested in the 6,200-ft. pay, through perforations at 6,204-07 ft.

A new gas-condensate pool in San Patricio County has been opened by A. O. Morgan 1 Ernest H. Lane, approximately 5 miles southwest of Sinton. The well flowed an open-flow potential of 16,500,000 cu. ft. of gas, and registered a shut-in pressure of 2,305 psi. Some condensate and salt water was produced in the test, but this was not gaged. The well flowed 2,900,000 cu. ft. of gas per day through a ¼-in. choke with 1,965 psi. working pressure, through perforations at 6,660-75 ft. Total depth is 7,505 ft., with 5½-in. casing set to 6,833 ft.

There were 25 new locations reported this week, 10 of which are wildcat starts 2 each in Liberty and Victoria counties and 1 each in Hardin, Jefferson, Karnes, Live Oak, Orange and Wharton counties. Three new pays were opened this week, 1 each in Texana field, Jackson County, Bonnie View field, Refugio County, and South Hutchins field, Wharton County. Five wildcats were dry, 2 in Chambers and 1 each in Jackson, Liberty, and Madison counties.

TEXAS GULF COAST SUCCESSFUL WILDCATS

Jackson County: New gas-condensate pay, Texana pool—Floyd L. Karsten 1 Geo. S. Clement et al, SE flank of field, redrill job in old Moore & Ahern and Cron & Gracey 1 Clement dry hole, TD 8,001 ft., top pay 6,300 ft., perf. 6,301-05 ft., IP: 2,846,000 cu. ft. gas per day and 20 bbl. per day condensate through a ¼-in. choke, shut-in pressure 2,250 psi., TP 1,915 psi., gravity 52.1°, no water. Top Discorbis 4,582 ft., Heterostegina 4,906 ft., Marginulina 5,086 ft., Frio 5,-148 ft., Vicksburg 7,910 ft.

Refugio County: New gas-condensate pay, Bonnie View pool—P. R. Rutherford 14 Henry Schirmer, Section 26, Johnson & Pugh. subd. of Bonnie View ranch, Esteban Lopez Grant, top pay 5,632 ft., TD 6,430 ft., perf. 5,632-36 ft., IP: 50,-000,000 cu. ft. gas per day on open flow, plus condensate. Flowed 2,965,000 cu. ft. gas per day and 54 bbl. condensate through a ¼-in. choke, TP 2,120 psi., shut-in pressure 2,190 psi., no water.

Wharton County: New oil sand, South Hutchins pool—McDannald Oil Co. 6 K. C. Martin, I&GN Sur., TD 6,015 ft., perf. 5,896-98 ft., IP: 192 bbl. oil per day through a ⅛-in. choke, gas-oil ratio 500, TP 950 psi., CP 2,200 psi., 30° gravity, no water.

TEXAS GULF COAST WILDCAT FAILURES

Chambers County: Blanke, Frost & Frazier 1 J. W. Garth, Jr. et al, T&NO Sur., 2½ mi. N of Fig Ridge field production, dry, TD 9,012 ft.

McCarthy Oil & Gas Corp. and Sun Oil Co. 1 Curtis Hankamer Tr., H&TC Sur., 2½ mi. SE of Hankamer field production, dry, TD 8,015 ft.

Jackson County: Sam G. Harrison 1 A. A. Egg et ux, Morris & Cummings Sur. 26, 1 mi. SW of Harmon field, dry, TD 7,812 ft.

Liberty County: Humble 1 M. L. & Z. M. Rosenthal, in Jno. Cole Sur., 2½ mi. SW of West Cleveland production, dry, TD 7,500 ft.

Madison County: Sun Oil Co. 2 J. A. Fannin, in Thos. Boatright Sur., dry, TD 2,937 ft.

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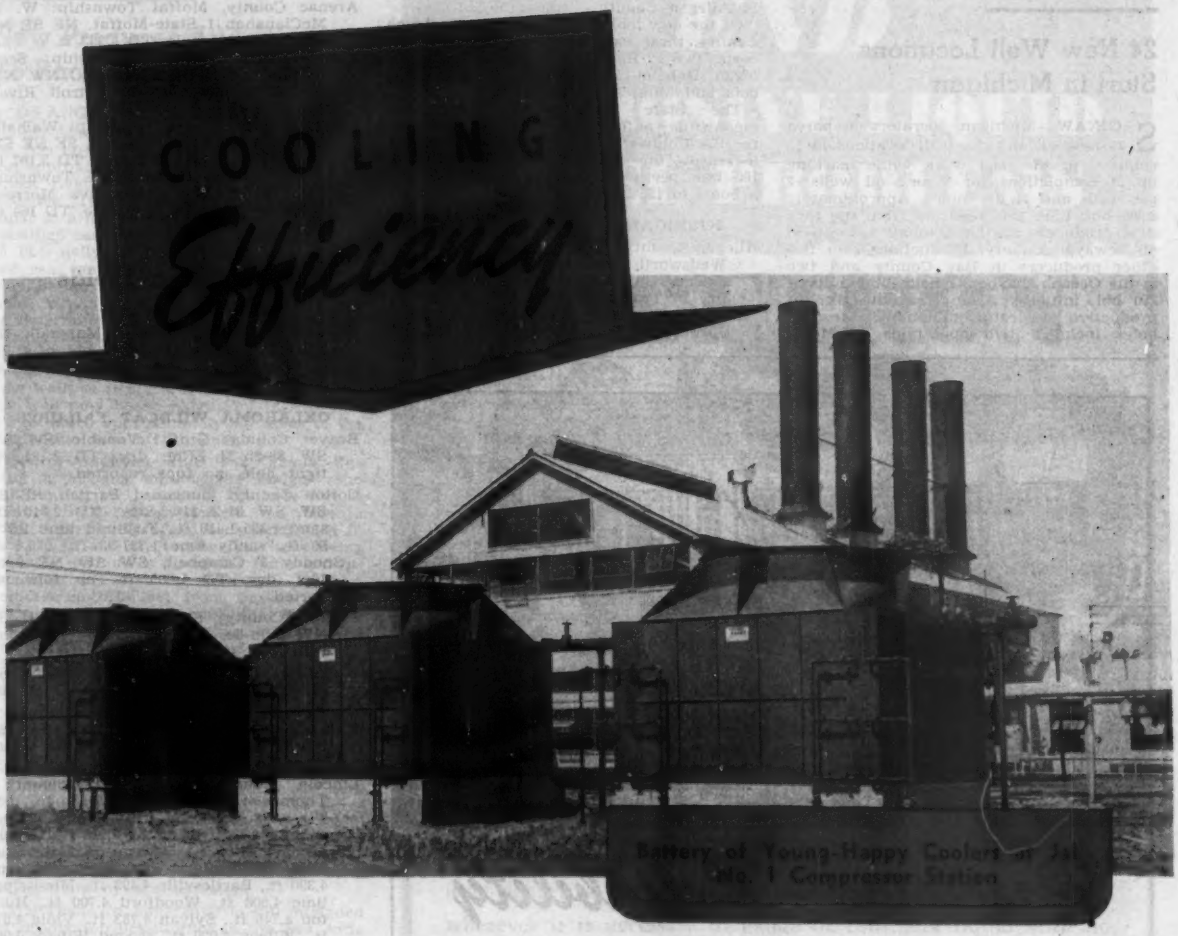

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MICHIGAN

24 New Well Locations Start in Michigan

SAGINAW.—Michigan operators prepared 24 new oil and gas well locations in 13 counties in the past week while marking up 21 completions for 8 new oil wells, 2 gas wells and 11 dry holes. Approximately 3,500 bbl. I. P. was reported from the four new producers in the Kimball Lake field of Newaygo County. Production from two other producers in Bay County and two in the Oceana-Claybanks field totaled about 250 bbl. initially. Aside from the six unproductive wildcat completions, the dry holes included two operations in Montcalm County, two in proximity to the Kimball Lake field and one other dry hole in Allegan County.

Of the new locations, five are in Newaygo County, three each in Clare, Bay and Mecosta, two in Barry, one each in Ionia, Allegan, Isabella, Lake Gratiot, Osceola, Tuscola and Montcalm counties.

The State Conservation Department meanwhile authorized a proration boost for the Coldwater field in Isabella County, increasing the daily allowable one-third to 100 bbl. per well. Owners had asked for a boost to 125 bbl.

MICHIGAN WILDCAT FAILURES

Allegan County, Allegan Township: H. L. Wadsworth and W. Spencer Cook 1 Jewett-Kinyon, SE SE NW 8-2n-13w, dry in Traverse limestone, TD 1,592 ft.

Manlius Township: Circle Drilling Co. 1 Jacob and Gertrude Ihle, NE NE SW 9-3n-15w, dry in Traverse limestone, TD 1,354 ft.

Arenac County, Moffat Township: W. L. McClanahan 1 State-Moffat, NE SE NE 32-20n-3e, dry hole, TD 4,393 ft.

Lake County, Peacock Township: Scott Drilling Co. 1 State-Peacock, NW NW NW 14-19n-13w, dry in Detroit River, TD 3,115 ft.

Mason County, Custer Township: Walhalla Oil Co. 1 Seamer-Thompson, SE NE SW 26-18n-16w, dry in Sylvania, TD 3,197 ft.

St. Clair County, Cottrellsville Township: Ray W. Matlock 1 Mrs. Iva Morrow, C SE SW 20-3n-16e, dry hole, TD 164 ft.

Oklahoma Fields

(Continued from page 154)

Pontotoc County: Cooper 1 Marshall, NE NE NW 31-6n-4e, flowed 50 bbl. of 41.9° gravity oil per day from Wanette at 3,240-46 ft., TD 3,246 ft.

OKLAHOMA WILDCAT FAILURES

Beaver County: Gulf 1 Venable, SW SW SW 32-3n-23 ECM, dry, TD 3,121 ft., tight hole, no tops reported.

Cotton County: Duncan 1 Parrish, SE SE SW SW 31-2s-11w, dry, TD 2,010 ft., sand 1,395-1,410 ft., Fusilinid lime 1,577-90 ft., sandy lime 1,727-93 ft.

Snoddy 1 Campbell, SW SW NE 9-4s-10w, dry, TD 1,605 ft., no tops reported.

Hughes County: Evans 1 Wilkes, SE SE NW 2-9n-8e, dry, TD 3,498 ft., Cromwell 3,492 ft.

Kingfisher County: Viersen 1 Stringer, SE SE SW 3-8n-5w, dry, TD 7,185 ft., no tops reported.

Kiowa County: Heartwell 1 Reed, SW SE NE 12-6n-19w, dry, TD 1,364 ft., Granite 1,358 ft.

Lincoln County: Vickers Petroleum 1 Thompson, NW NE SE 17-15n-4e, dry, TD 5,038 ft., Belle City 2,578 ft., Hogshooter 2,872 ft., Layton 2,918 ft., Checkerboard 3,195 ft., Oswego 3,852 ft., Prue 3,927 ft., Verdigris 4,000 ft., brown lime 4,390 ft., Bartlesville 4,493 ft., Mississippi lime 4,508 ft., Woodford 4,700 ft., Hunton 4,745 ft., Sylvan 4,783 ft., Viola 4,870 ft., Wilcox 4,930 ft., second Wilcox 4,988 ft.

Murray County: Sohio 1 Cape, NW SE SE 12-1n-2e, dry, TD 2,508 ft., Basal Pontotoc and Bromide 1,260 ft., McLish dense 1,355 ft., Basal McLish sand 1,752 ft., Arbuckle 2,491 ft.

Anderson 1 Chipman, NW SW NE 11-1s-2e, dry, TD 4,278 ft., no tops reported.

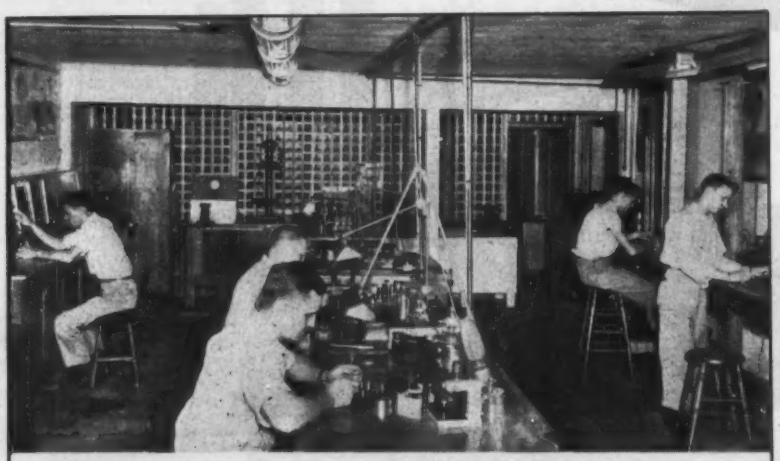
Oklahoma County: Carter 1 Larkin, C NW SE 7-11n-1w, dry, TD 7,123 ft., Pawhuska 3,193 ft., Upper Hoover 3,345 ft., Lower Hoover 3,555 ft., Oread 4,048 ft., Tonkawa lime 4,240 ft., Avant 4,658 ft., Hogshooter 5,165 ft., Checkerboard 5,465 ft., Oswego 6,058 ft., Prue 6,135-42 ft., Verdigris 6,186 ft., Skinner 6,249 ft., Red Fork 6,310 ft., sand 6,366-68 ft. with slight stain of oil, Sylvan 6,680 ft., Viola 6,786 ft., dense 6,836 ft., dolomite 6,866 ft., Marshall 6,985 ft., second Wilcox 7,071 ft.

Payne County: Wood 1 Furman, NE NE SW 32-20n-2e, dry, TD 4,910 ft., Woodford 4,673 ft., Sylvan 4,712 ft., Viola 4,785 ft., dense 4,820 ft., dolomite dense 4,825 ft., Wilcox 4,853 ft., second Wilcox 4,901 ft.

Arrington 1 Smith, SE SE NW 4-19n-4e, dry, TD 3,676 ft., Oswego 3,170 ft., Prue 3,400 ft., Skinner 3,540 ft., Bartlesville 3,597-3,665 ft.

Pittsburgh County: Geological wildcat—Olson 1-B Coleman, C SW SW 10-7n-18e, dry, TD 7,440 ft., Wapanucka lime 6,750 ft., Union Valley 7,153 ft., Cromwell 7,212-98 ft.

Seminole County: Byrd 1 Gates "B," SW SW SW 24-9n-5e, dry, TD 3,695 ft., Lower Calvin 2,865 ft., Senora sand 3,110-30 ft., broken lime 3,135-65 ft., Earlsboro 3,340 ft., Bartlesville 3,430 ft., brown lime 3,555 ft., Booch 3,614 ft.



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CALIFORNIA

New Producer Added To Race Track Area

LOS ANGELES.—The combination of British-American Oil Co. and the Capitol Co. has apparently opened a new oil horizon approximately ⅛ mile west of the Race Track field with their 66-4 Portals-Berry, 4-30s-29e. This exploratory venture was finished at a total depth of 3,504 ft. in an unclassified sand with an initial production of 50 bbl. daily on pump. Water cut was 40 per cent and it is thought that the well may be an edge well of the Race Track field. Whether or not this is correct can be determined by classification of the producing sand and by future drilling. No dry holes exist between the present productive limits of the Race Track Hill field and the new well, so it appears quite probable that the well may be an extension. In this case it has added approximately 300 acres to the productive area of the field.

British-American and The Texas Co., after apparently missing the Bodger sand and finding the bottom of the hole wet in their 4 Bodger, 22-3s-14w, in the Alondra Park area, have plugged back from 9,134 ft. to 9,020 ft. and are testing. The zone being tested at present is a nodular shale and indications are that the well will make a commercial producer from this formation. Operators have announced that following the testing they will set a bottom plug and finish the well. The 4 Bodger will be the fourth producer completed in the area. Meanwhile British-American and the Texas Co. have set conductor pipe in the 1 Village Community, located at a point southeast of the 4 Bodger, and the General Petroleum Corp. is preparing to start the 1 Alondra Community Eight in Section 16-3s-14w.

Union Oil Co. continues to drill and core ahead below 11,459 ft. with their 48 Rosecrans, 19-3s-13w, in the Rosecrans field. Union is drilling the well as a deep test in the field and the objective is the equivalent of the deep DeSoto sand in the Long Beach field or the basement.

The Texas Co. apparently is still intrigued by production possibilities in the San Ardo Area of Monterey County. The company staked location for its third exploratory venture in the area during the past week. This new test will be known as the 1 Lombardi, and location, in Section 27-22s-10e, is approximately ½ mile from the North American 1 Jergins, 34-22s-10e, which encountered showings at several intervals before reaching the Granite at 2,500 ft. Meanwhile, North American-Jergins are reported to be seeking location for another test at a point more favorable from the standpoint of structure.

California completions continued their upward trend during the past week as operators announced the completion of 50 wells. In addition to 8 wildcat ventures, 42 field wells were finaled, including a dry hole each for the Cymric and Orcutt fields. Leading in activity was the Wilmington field with seven new oil wells, while Kern River reported five, Huntington Beach four, Cymric three, and Kern Front, Lost Hills and San Miguelito two each.

CALIFORNIA SUCCESSFUL WILDCATS

Kern County, Cymric Area: Independent Exploration Co. 12-A Cymric, 21-29s-21e, IP 898,000 cu. ft. gas through 12/64-in. choke, 7-in. casing 4,760 ft., perf. 4,715-35 ft., Oceanic Oil sand 4,692 ft., TD 4,760 ft.

Elk Hills Area: Standard of California 366-32S U.O.N.P.R., 32-30s-24e, flowing by heads, no estimate, 20/64-in. choke, gravity 33.4°, cut 0.3 per cent, 412 ft. of perf. liner landed at 6,753 ft., TD 7,225 ft.

CALIFORNIA WILDCAT FAILURES

Butte County, North Glenn Area: Standard

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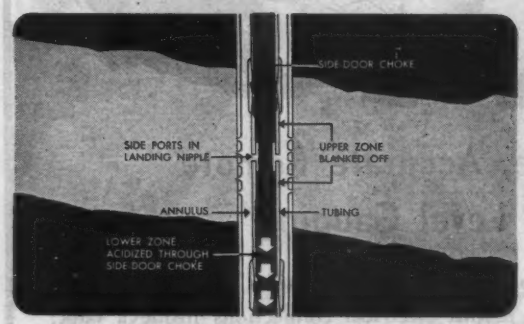
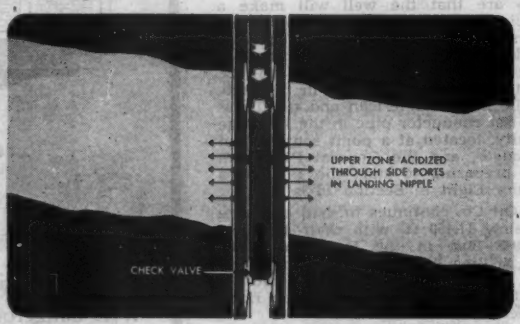
Use of Otis Side-Door Chokes for dual-completion and acidizing becomes standard practice in East Texas fields

1 "The use of Otis dual-completion equipment in acidizing and completing two-zone wells has proven so successful during the past few years that the majority of operators in this territory now accept it as standard operating procedure. This is especially true around the Carthage area. A typical operation of this type was on a 6200-foot well completed by the Blank Corporation last June. They contacted our Longview office and we delivered a Type L Landing Nipple to the well site.

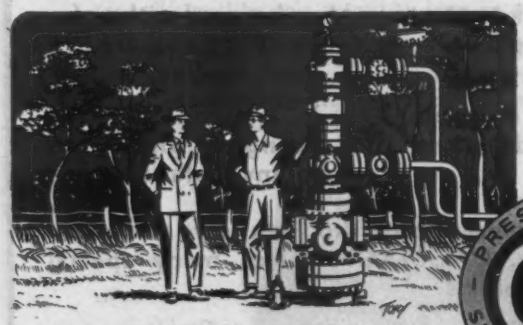
2 "After the packer had been set, the tubing was landed with the Type L Nipple located in the upper zone at 6132 feet. Surface connections were permanently installed while the well was still loaded with mud. Then, by establishing circulation between the casing and tubing through the four ½-inch ports in the Landing Nipple, the annular space was easily unloaded. This eliminated all risks of trying to acidize and bring the well in before the packer was set and surface controls were hooked up.



3 "An Otis service crew then rigged up our high-pressure lubricator and wire line equipment (well pressure was 2700 p.s.i.) and ran a 2½" Type L Side-Door Choke on a steel measuring line. With the Side-Door Choke seated in the Landing Nipple the fluid course from the annulus to the tubing was blanked off by respective sets of pressure-seal packing located above and below the side ports. Thus, with the upper sand blanked off, acid was pumped through the tubing and Choke and into the lower sand.



4 "After the Side-Door Choke was pulled the well was allowed to clean itself. We then made up an Otis Check Valve on our line and ran it to the bottom of the Type L Landing Nipple to plug all downward flow. (The tool itself is a drop check valve mounted on a packing mandrel. One set of packing prevents downward flow from entering the lower zone around the valve). With the lower zone blanked off, acid was pumped down the tubing and out through the side ports in the nipple into the upper zone. The Check Valve was then pulled.



5 "After both zones had been successfully acidized the Type L Side-Door Choke was re-run and locked in the Type L Landing Nipple. Through this installation the lower zone is now producing through the Side-Door Choke, while the upper zone is producing through the annulus—and the well is permanently equipped with side ports which can be easily opened and closed without moving the tubing should it become necessary to kill the well, re-acidize, take bottom-hole pressures of either zone through the tubing, etc."

This is the sixth in a series of advertisements describing actual installations of Sub-Surface Controls and subsequent service by Otis Pressure Control, Inc. For further details on equipment and service, write Otis Pressure Control, Inc., P. O. Box 7206, Dallas.

(T-7)

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of California 1 Dodge Lands, 31-20n-1e, dry, elev. 109 ft., TD 7,888 ft.

Fresno County, Coalinga Area: Fresno Oil Investment, Inc., 2 Phelps Gov't., 20-19s-15e, dry, elev. 1,575 ft., TD 4,582 ft.

Kingsburg Area: Riverbend Oil Corp. 1 Guggenhime, 5-15s-23e, dry, elev. 430 ft., top hard Granite 1,397 ft., TD 1,401 ft.

Kern County, Edison Area: Bender Oil Operations 1 Porter, 20-30s-29e, dry, Nichols 3,806 ft., Transition 4,343 ft., Santa Margarita 4,494 ft., TD 4,520 ft.

Los Angeles County, East Los Angeles Area: Richfield Oil Corp. 1 North Side, 7-2s-12w, dry, could not recover fish, elev. 157 ft., TD 7,369 ft.

Orange County, Westminster Area: Seaboard Oil Co. 44-17 Bauer, 17-5s-10w, dry, TD 8,747 ft.

PERMIAN BASIN

Gulf Seeks Designation Of Discovery Well

MIDLAND.—Gulf Oil Corp. this week filed application with the Texas Railroad Commission for designation of its 48 Keystone as discovery well of the Keystone 5,100 field. The well is an old one deepened from limestone pay around 3,300 ft., and is now believed to be producing from the Clear Fork.

Deepened to 5,047 ft., top of pay zone was 4,860 ft., and after acid treatment the well flowed 585 bbl. of 39.6°-gravity oil through ½-in. tubing choke, on completion tests. Gas-oil ratio was 1,328. Location of the well is 440 ft. out of the northwest corner of Section 10, Block 3, Public School Lands.

The 48 Keystone is producing from between the Holt and Tubb zones, and previously identified as the upper Clear Fork in Gulf's 99-E Keystone, now an Ellenburger producer ⅝-mile to the southeast, in the same section. The 99-E Keystone blew out at 5,041 ft. and indicated commercial production from the same zone on drill-stem tests before being drilled on to the Ellenburger. Some geologists contend the pay zone is lower Holt, from which several wells are producing. Further information on the new zone will be obtained when Gulf deepens its 27 Keystone, one location east of the 99-E Keystone, from its present limestone production at 3,525 ft., to 5,000 ft.

In southeastern Upton County, 12 miles northwest of Rankin, Slick-Urschel Oil Co. 1 D. L. Alford found additional pay in the Ellenburger, making a total thickness of 165 ft. First production was indicated on a drill-stem test at 11,091-11,166 ft. Latest test, from 11,206-56 ft., using a 1,000-ft. water blanket, brought gas to the surface in 8 minutes, estimated at 12,600,000 cu. ft. a day. Oil started flowing immediately after the gas, at the rate of 5 to 10 bbl. of 50° gravity an hour. Final recovery, with the tool open 30 minutes, was 600 ft. of oil. No water or mud was reported with the oil. Top of the pay section was 11,021 ft.

Humble Oil & Refining Co. has staked location for a 7,500-ft. wildcat 3½ miles west and ¼ mile south of the Petersburg discovery well in southeastern Hale County. The new test will be the 1 J. A. Lutrick, 660 ft. from south and 1,980 ft. from east lines of Section 14, Block D-8, EL&R Survey. The new well will seek production in the Cisco series of the Pennsylvanian, from which Stanolind Oil & Gas Co. 1 Fisher produces. Stanolind's 2 Fisher, ⅜ mile northeast of the discovery, was drilling below 7,435 ft. on last report.

A southwest extension to the Fullerton field, Andrews County, was completed by Stanolind Oil & Gas Co. at its 2 E. T. Brooks, Section 9, Block A-48. The well flowed 125 bbl. of oil a day through ¼-in. choke, from pay topped at 6,824 ft.

A prospective 150-bbl. pumper extending San Andres production 1 mile to the southeast of the Adair field, Terry and Gaines counties, was seen in the Paul E. Rutledge 1 Sarah E. Wilson Bice. Total depth was 4,903 ft. After acid treatment, and swabbing to clean, the well produced clean oil at the rate of 4 to 6 bbl. an hour. Operators moved the rotary off and estimated the 150-bbl. daily potential rate.

Pan American Production Co. 1 Hugh Campbell, Runnells County wildcat 4 miles north of Ballinger, was at 4,503 ft., and apparently still in the Ellenburger pay. First drill-stem test from 4,465-80 ft., open approximately 15 minutes, recovered 30 ft. of oil and gas-cut mud. A previous test at 4,391-4,417 ft. yielded about the same amount of oil-cut mud, but no free oil. Drill-stem tests at 4,383-4,401 and 4,341-91 ft., both in the Ellenburger, topped at 4,332 ft., recovered some 500 ft. of free oil on each attempt. Southern Minerals Corp. 2 K. V. Northington, southwest offset to 1 Northington, prospective small Pennsylvanian pumper, was drilling below 750 ft. in shale. Location is 1½ miles west of Ballinger.

Plans for additional exploration of the Ellenburger northeast of Ballinger were announced last week by E. S. Price, who said his 2 Reese, in that area, was swabbing and flowing some 60 bbl. of fluid daily from the upper Fry at 3,647-50 ft. Amount of water has decreased to 20 per cent, he said. On an elevation of 1,834 ft., the 2 Reese reported top of the Ellenburger at 4,362 ft., and showing gas odors and fluorescence in several zones to 4,596 ft.

WEST TEXAS WILDCAT FAILURES

Howard County: Hickok & Reynolds 1-A B. F. McGettes, Sec. 10, Blk. 30, T&P Sur., 7½ mi. NE Coahoma, dry, TD 2,200 ft., San Andres 2,185 ft., elev. 2,279 ft.

Lynn County: Honolulu Oil Corp. 1 W. B. King, Sec. 424, Blk. 21, HE&WT Sur., 9 mi. NW Wilson, dry, TD 10,756 ft., San Andres 3,750 ft., Glorietta 5,280 ft., Ellenburger 10,315 ft., elev. 3,215 ft.

TEXAS PANHANDLE WILDCAT FAILURE

Collingsworth County: L. M. Hughes 1 Coleman, Sec. 23, Blk. 16, H&GN Sur., 1½ mi. N Lutie, dry, TD 2,522 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Mid-Continent Petroleum Corp. 1-A Sawyer, 27-9s-36e, northeastern Lea County wildcat, recovered 40 ft. of mud, with no shows, on a 2-hour drill-stem test between 5,830-5,957 ft. Ten miles southwest of Crossroads, also in northwest Lea County, Magnolia Petroleum Co. 1-A Santa Fe-Pacific, 33-10s-36e, was to be abandoned at 5,508 ft.

Amerada Petroleum Corp. 5 Phillips, 1-20s-36e, deep test to the Ellenburger in the Monument field, was drilling below 9,640 ft. The same company's 2 H. S. Record, a 12,000-ft. rotary test in 25-19s-35e, northwestern edge of Monument, was drilling below 7,975 ft. A drill-stem test at 7,447-91 ft., open 4 hours, produced a slight blow of air and recovered 1,000 ft. of mud, with no shows. R. Olsen et al 1 Wimberly, Ellenburger test 3½ miles due east of Jal, in 23-25s-37e, was drilling below 8,795 ft. Tops reported were: Glorietta 4,620 ft., Devonian 7,335 ft., Montoya 7,660 ft., Simpson 8,090 ft. Nine miles southwest of the Vacuum field, Peckham & Clark 1 Hightower, 31-18s-32w, originally drilled to 3,569 ft., was shut down by a fishing job at 4,150 ft.

In Eddy County, Mesa Retailers, Inc. 1 Blind Snake, 2-16s-25e, 7 miles northeast of Artesia, was drilling below 3,480 ft. in limestone. Top of the Tubbs was 3,190 ft. New exploration work under way in Eddy County included R. W. Fair 1 Bowers "B," 29-19s-27e, 2 miles west of nearest production; Magnolia Petroleum Co. 1-W State, 16-21s-22e, a 7,500-ft. rotary test 27 miles west of Carlsbad; Sam Sanders 1 Edith Riggs-Federal, 3-21s-24e, shallow cable tool test 13½ miles northwest of Carlsbad; and Ralph A. Shugart 1 Superior-Federal, 26-21s-25e, shallow cable tool test 8½ miles northwest of Carlsbad.

Night Operations

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LA.-ARK.

Glen Rose Production Potential, 125 Bbl. Daily

EL DORADO.—Glen Rose production connecting the Stephens and Wesson areas of Ouachita County was confirmed at Ormond Corp. 1 J. D. McClurkin Estate, NW NW 34-15s-19w, which made potential of 125 bbl. of 32.4°-gravity oil a day from perforations at 3,123-31 ft. Total depth was 3,140 ft. Top of the James was logged at 2,910 ft., and the Hogg sand at 3,095-3,131 ft.

In Columbia County, McAlester Fuel Co. 1-A Paschal, 19-15s-20w, continued testing. A drill-stem test of perforations at 3,718-32 ft. produced a slight blow. A second test at 3,718-29 ft., open 4½ hours, recovered 2,630 ft. of fluid, being 250 ft. of water cushion and the balance mud with salt water and a scum of oil. Operators swabbed for 24 hours, recovering salt water with oil scum. Chicago Corp. 1 Chaffin, 29-18s-20w, was drilling below 5,537 ft. in Travis Peak. Cores from 4,962-69 ft. recovered 1 ft. of slightly porous limestone, bleeding oil, and 5 ft. of hard, dense limestone and shale, with no shows. Sample tops reported, on an elevation of 258 ft., were James 4,583 ft., and Sligo 4,851 ft.

In Lafayette County, Barnsdall Oil Co. and G. H. Vaughn 1 Bodcaw Lumber Co., 8-18s-23w, continued drilling ahead below 9,901 ft., in the Smackover, after running electric log to 9,707 ft. Top of the Cotton Valley was 7,056 ft., Buckner 9,366 ft., and Smackover at 9,417 ft. Smackover porosity, containing salt water, was at 9,447 ft. Cores at 9,870-79 ft. recovered 1½ ft. of limestone having a sulfur odor and a slight show of oil.

In North Louisiana, Hunt Oil Co. 1 Louisiana Delta Lumber Co., 6-4n-53, Catahoula Parish, was drilling ahead below 7,612 ft., in the Midway formation, after finding shows of oil and gas in side-wall cores. Four side-wall cores at 5,500-5,523 ft. recovered sand having a good gas odor, and 2 side-wall cores, at 5,580 and 5,598 ft., recovered sand with good oil odor.

In Union Parish, Pan American Production Co. 1 Elva Bugg, 31-20n-1w, continued drilling and was below 8,899 ft. in the Cotton Valley on last report. Top 5 ft. in coring from 8,801-20 ft. was slightly sandy with gas odor. Additional shaly sand with gas odor was cored at 8,846-71 ft., and in side-wall cores at 8,771-79 ft. Operators set casing to 8,830 ft., and were waiting on cement.

Six miles southwest of Fort Necessity, and 25 miles from nearest production, R. L. Fisher 1-A Tensas Delta Land Co., 5-11n-6e, had total depth at 6,808 ft., in the Tuscaloosa. Electric log was run to 6,760 ft., placing the chalk at 5,065-5,310 ft., and top of the Tuscaloosa at 6,345 ft. Also in Franklin Parish, 10 miles southwest of Winnsboro, H. L. Hunt 1 Kincaid, 19-12n-7e, was drilling below 6,650 ft. in Tuscaloosa. Cores from 6,465-80 ft. recovered shale and sand, with no shows. Operators were running electric log.

Other wildcat tests reported were: Lion Oil Co. 1 Colbert, 14-17n-6w, Bienville Parish, coring at 7,580 ft. Carter Oil Co. 1 Gandy, 28-19n-7w, Claiborne Parish, coring at 7,894 ft. in Travis Peak, topped at 6,850 ft. Hassie Hunt 1 James, 10-22n-4w, drilling below 10,730 ft. in Smackover. F. A. Callery et al 1 C. E. Ellerbe, 18-15n-12w, DeSoto Parish, drilling below 1,993 ft. in sandy shale. Union Producing Co. 1-A O'Brien, 5-19n-11e, East Carroll Parish, drilling below 4,674 ft. Gas rock, by samples, was placed at 2,400-2,640 ft. H. L. Hunt 138-F Nebo Oil Co., 21-9n-2w, Grant Parish, drilling below 5,867 ft. Some operators' 137-F Goodpine, 20-9n-4e, LaSalle Parish, drilling below 8,046 ft. California Co. 2 Breece Lumber Co., 30-17 -5e, Ouachita Parish, drilling below 6,718 ft. in Travis Peak topped at 5,294 ft., by samples. Hunt Oil Co. 1 Haynesville Mercantile Co., 9-23n-9w, Webster Parish, shut down for repairs at 11,147 ft. Sample top on the Buckner was 10,816 ft.

NORTH LOUISIANA WILDCAT FAILURES

Catahoula Parish: General American Oil Corp. 1 Sam Calvert, NE NW SE 35-7n-6e, dry, TD 9,606 ft., Midway 6,860 ft., Tuscaloosa 8,848 ft., Marine Tuscaloosa 9,030 ft., Massive sand 9,463 ft., Lower Cretaceous 9,580 ft., elev. 61 ft.

LaSalle Parish: C. H. Murphy, Jr. 1 Tensas Delta, SE NE 36-6n-4e, dry, TD 9,022 ft., Marine Tuscaloosa 8,436 ft., Massive sand 8,919 ft., Lower Cretaceous 8,972 ft., elev. 59 ft.

Placid Oil Co. 126 Louisiana Central, NE NE 15-10n-4e, dry, TD 8,920 ft., Massive sand 7,494 ft., Paluxy 7,670 ft., elev. 225 ft.

Natchitoches Parish: Schmitz & Warner 1 W. W. Page, 5-8n-9w, dry, TD 6,316 ft., Tuscaloosa 4,335 ft., crossed fault 5,220 ft., Glen Rose 5,325 ft., Rodessa porosity 6,285 ft., elev. 145 ft.

Richland Parish: Peterson Petroleum Co. 1 M. E. Wooten, 25-15n-5e, dry, TD 4,005 ft., chalk 2,640 ft., Tuscaloosa 2,927 ft., Lower Cretaceous 3,664 ft., elev. 64 ft.

ARKANSAS WILDCAT FAILURES

Chicot County: Basin Oil Co. 1 J. H. Dowdle, C NE 17-18s-1w, dry, TD 4,830 ft., Cotton Valley 3,211 ft., elev. 117 ft.

Lafayette County: McAlester Fuel Co. 1-A Schewmake, SE SW NW 7-16s-23w, dry, TD 4,982 ft., Midway 1,020 ft., Annona 2,170-2,316 ft., Tokio 2,632 ft., Paluxy 3,054 ft., good porosity 4,210-50 ft., slight show of oil 4,227-32 ft., elev. 259 ft.

OHIO, KENTUCKY

New Sego Pool Well Makes 108 Bbl. Daily

COLUMBUS.—B. G. Bartley et al 1 Howard Shinn, Section 27, Madison Township, Perry County, came in as one of the best wells in the Sego pool. Clinton sand at 3,356-3,400 ft. was shot with 80 qt. and made 108 bbl. in the first 24 hours. North and south offsets have been staked. A mile to the northwest Allen Willey et al 2 Roy C. Cooper, Section 22, reached the Clinton at 3,330 ft. and was drilled to 3,355 ft., where it gaged 1,380,000 cu. ft. of gas. It is probable that the gas will be turned into the line for some time before the well is drilled on down to the oil pay.

In the southwest part of Hopewell Township, Perry County, the Zanesville Tool & Supply 1 Elmer Cotterman, Section 29, topped the Clinton at 2,858 ft. and was drilled to 8 ft. in the sand where the well gaged 1,245,000 cu. ft. natural.

The second Berea gas production at Gilmore has been extended across into Perry Township, Tuscarawas County, by the Petroleum Drilling 1 Caroline Davidson, Section 5. First Berea at 1,315-60 ft. gaged 80,000 cu. ft. and the second sand at 1,365 ft. gaged 1,000,000 cu. ft. Three strings of tools are now running in the pool.

The new oil production east of Bladensburg was extended ¼ mile northeast by the Shuff & Bucy 1 Clare Miller, Section 8, Jackson Township, Knox County. Clinton sand at 2,952-3,000 ft. showed 10 bbl. natural and 85 bbl. the first 24 hours after a 120-qt. shot. The same operator is drilling a well on Cotrell in Section 7.

OHIO WILDCAT FAILURES

Meigs County, Orange Township: Nollem Oil & Gas Co. 1 C. & A. Ashworth, Sec. 33, Oriskany 3,636-50 ft., TD 3,700 ft.

Wayne County, Chester Township: A. F. Bryan 1 Fred Ward, Sec. 34, Clinton 3,147-64 ft., TD 3,225 ft.

EASTERN KENTUCKY

ASHLAND.—Three dry holes were noted during the past week's operation in Eastern Kentucky. Kentucky-West Virginia Gas Co. reported well No. 864, E. L. Pinson, Pike County, at 3,410 ft.; No. 5721, David Newsom, Pike, at 3,633 ft.; and No. 5659, John M. Conley, Knott County, at 2,574 ft.

WESTERN KENTUCKY

OWENSBORO.—In an area 1½ miles east of Lewisburg, Logan County, S. W. Mitchell has hit McClosky pay for 75 bbl. per day at his wildcat, 1 Logsdon, 21-G-31. McClosky was found at 585-605 ft. and well treated with 1,000 gal. of acid. A number of other operators are drilling wells in the area.

Development drilling continues at Slaughters pool, the newly discovered prolific pool in Webster County where 11 wells are currently under way.

INDIANA

EVANSVILLE.—Production tests are under way at a Barsland Oil Co. wildcat about 130 miles southeast of Chicago in Miami County. The discovery, 4 Frank Pillott, 330 ft. from south line and 165 ft. from state highway 31, 21-27n-4e, bailed 100 bbl. of oil in 8 hours from Trenton limestone zone at 840-48 ft. Total depth is 848 ft. The well has not been acidized. It is near the town of Peru and the abandoned Peru field.

Nickle Oil Co. 3 Ed Crecelius, 213 ft. from north and 60 ft. from east lines SW 5-2s-10w, Princeton North pool, Gibson County, had a very favorable drill-stem test of O'Hara sand. On 1-hour test the operators got 1,750 ft. of gas, 314 ft. of oil, and no water. This is the first O'Hara pay in the Princeton North pool.

Drilling permits granted for the week totaled 14, with 4 of the wells to be drilled in Gibson County, 2 in Pike, and 1 each in Dearborn, Decatur, Hamilton, Harrison, Huntington, Miami, Sullivan, and Vigo.

ILLINOIS

Wayne County Test Swabs 250 Bbl. Daily

MATTOON.—In the Clay City Consolidated pool area, 5 miles northeast of Enterprise, Wayne County, the Don Slape 1 Hosselton, NW NW NE 29-2n-8e, swabbed 250 bbl. of oil per day natural from Rosiclare at 2,998-3,010 ft. This well, with total depth of 3,010 ft., is to be acidized. It is ½ mile from other production.

Third day pumping gage on Calvert & Willis, Inc. 1 Charles Yunker, outpost to Schnell pool, Richland County, showed 85 bbl. of oil and 12 water as compared with earlier test of 140 bbl. oil and 33 water in 21 hours. This test is midway between Flora and Olney.

After a favorable drill-stem test, operators are preparing to run production test on T. Blake Dirickson and Don Slape 1 Buester, a wildcat in area 15 miles northwest of Olney in Clay County. This test located 165 ft. from north and 330 ft. from east lines, SW SE NE 2-4n-8e, and is 1½ miles from other production. On drill-stem test of McClosky lime from 3,019-25 ft. it got gas in 2 minutes and flowed natural clean oil in 9 minutes.

ILLINOIS WILDCAT FAILURES

Bond County: Davidson 1 Nall, SW NW SW 5-4n-3w, dry, TD 1,320 ft.

Clay County: Everhart 1 Beare, NE NW SW 27-4n-6e, dry, TD 3,043 ft.

Fayette County: Strickland 1 Usinger, SW SE SW 13-5n-2e, dry, TD 2,163 ft.

Hamilton County: Fleming 1 Laswell heirs, NE NE NW 5-7s-6e, dry, TD 3,461 ft.

Madison County: Sohio 1 O'Henke, NW NW NW 20-6n-6w, dry, TD 2,378 ft.

Wabash County: Fulk 1 Seibert, SW SW NE 14-1n-14w, dry, TD 2,892 ft.

Illinois Mid-Continent - Kleinschmidt, SW NE NW 24-2s-14w, dry, TD 2,972 ft.

Wayne County: Gilliam Drilling Co. 1 Davis, SE SW SE 20-2n-7e, dry, TD 3,230 ft.

SUMMARY OF COMPLETIONS, SEPTEMBER 1947

	Cmp.	Oil	Prod.	Gas	Dry	Under 1,000 ft.	1,000-2,500 ft.	2,500-5,000 ft.	5,000-10,000 ft.	Over 10,000 ft.	Total footage	Rigs and drilling
New York	122	61	131	0	[1]61	0	122	0	0	0	177,686	170
Pennsylvania	316	157	346	24	[3]135	0	0	316	0	0	497,921	254
West Virginia	79	14	544	52	13	1	35	38	5	0	199,380	247
Ohio	124	24	525	43	[3]57	16	43	64	1	0	326,592	244
Indiana	66	36	2,272	3	27	20	37	9	0	0	108,554	79
Kentucky	51	22	1,949	12	17	2	33	11	5	0	94,215	78
Illinois	204	101	8,425	2	101	19	53	132	0	0	510,295	211
Michigan	84	34	16,595	8	[4]42	1	59	24	0	0	184,389	135
Kansas	215	109	45,477	39	[5]67	0	18	195	2	0	698,875	414
Neb., Mo., Iowa	0	0	0	0	0	0	0	0	0	0	0	11
Oklahoma	314	[6]158	16,455	29	[6]127	25	108	145	34	2	937,879	544
Texas	736	447	79,330	48	241	57	129	304	231	15	3,223,808	1,090
North	150	75	11,185	1	[7]74	21	52	50	27	0	440,381	169
West Central	67	26	4,994	3	38	5	16	43	3	0	206,220	94
West	183	162	40,960	1	20	21	28	79	52	3	782,777	209
Panhandle	49	27	2,220	18	4	0	3	44	2	0	158,103	129
Eastern	53	[8]32	5,952	8	13	0	3	25	24	1	289,078	103
Gulf Coast	125	[10]84	6,333	12	49	1	5	35	73	11	810,482	193
Southwest	109	[11]61	7,686	5	43	9	22	28	50	0	536,817	193
Louisiana	140	93	12,111	8	39	2	62	19	38	19	642,758	249
Northern	91	56	5,746	8	27	2	62	16	11	0	235,258	115
Southern	49	[12]37	6,365	[9]0	12	0	0	3	27	19	407,500	134
Arkansas	32	19	2,180	0	13	0	4	26	2	0	108,931	42
Mississippi	31	[8]19	5,910	1	11	0	0	3	18	10	267,023	73
Ala., Ga., Fla.	7	2	197	0	5	0	1	4	2	0	28,264	13
Montana	33	17	1,363	8	8	5	19	9	0	0	65,262	72
Wyoming	25	16	5,189	4	5	1	3	9	10	2	130,918	104
Colorado-Utah	18	13	2,787	1	4	2	0	1	14	1	104,512	78
New Mexico	44	36	7,721	3	5	1	7	19	17	0	193,306	132
California	183	[8]144	31,425	4	35	9	53	59	51	11	789,252	246
Total September 1947	2,824	1,522	240,937	289	1,013	161	786	1,387	430	60	9,289,820	4,486
Total August 1947	3,402	1,810	310,318	311	1,281	189	1,000	1,616	517	80	11,260,227	4,447
Total September 1946	2,535	1,362	231,248	289	884	79	1,034	1,002	376	44	7,943,948	4,072

Service wells included: [1]61, [2]132, [3]9, [4]15, [5]1, [6]7, [7]2. Distillate wells included: [8]1, [9]2, [10]11, [11]3, [12]4.

Penn State Conference Features Eight Papers

RESULTS of an aerial magnetometer survey to evaluate oil and gas possibilities of central Pennsylvania will be revealed at the eleventh annual Penn State Secondary Recovery Conference October 31-November 1 at the Pennsylvania State College.

The Pennsylvania Grade Crude Oil Association is cooperating in the conference which will open at 2 p.m. October 31, in the college's school of mineral industries. Technical sessions at which the college staff will present papers will occupy Friday afternoon and Saturday morning. A dinner Friday evening will provide the annual social feature.

The program follows:

FRIDAY, OCTOBER 31

2 p.m., technical session.—Presiding, A. P. Clark, Jr., South Penn Oil Co., Bradford, Pa., and Douglas Brown, Jr., Brundred Oil Corp., Oil City, Pa.: "Capillary Pressure Studies," K. W. Smith and C. D. Stahl; "Report on Selective Plugging With Smoke," R. F. Nielsen; "Relative Permeability Studies," J. H. Henderson; "Water Injection in Air-Gas Drive," D. E. Menzie; "Airborne Magnetometer Survey of Central Pennsylvania," S. J. Pirson and L. O. Bacon.

6:15 p.m., dinner.—Presiding, G. W. Holbrook, Bradley Producing Co., Wellsville, N. Y., chairman of the association's research advisory committee; remarks, Edward Steidle, dean of the mineral industries school, and A. W. Gauger, director of the college's mineral industries experiment station; inspection of laboratories and informal discussions.

SATURDAY, NOVEMBER 1

9 a.m., technical session.—Presiding, S. S. Taylor, U. S. Bureau of Mines station, Franklin, Pa.; "Geologic Aspects of Prospecting for Deep Oil Horizons in Pennsylvania," F. N. Swartz; "Petrologic Aspects of Prospecting for Deep Oil Horizons in Pennsylvania," P. D. Krynine; "Water Flooding Spacing," S. T. Yuster; open forum on oil production problems.

Gulf Estimates Purchases At $300,000,000 in 1948

In support of the industry-wide program for increasing oil production, refining, and distribution, Gulf Oil Corp. is seeking to fulfill its pipe requirements of 250,000 tons, for the coming year, although prospects indicate only 80,000 tons available.

Gulf expects company purchases for goods and services, not including refined or crude oil, to total $300,000,000 in 1948, a company statement said.

Texas Underproduction 8.32 Per Cent in August

Leases totaling 21,810 in 10 districts with wells numbering 104,728 have reported an August production of 71,678,915 bbl. in Texas, according to Texas Railroad Commission data compiled from monthly reports of crude oil producers. Production for the state was 8.32 per cent under the allowable for that month.

Production for 150 leases was not reported. The allowable for those leases amounted to 70,595 bbl. which in addition to the actual production would give an indicated production of 71,749,510 bbl. Under production was 6,507,545 bbl.

Runs to pipe lines for the month totaled 71,222,562 bbl. Other disposals were: tank cars, 24,355 bbl.; trucks, 244,565 bbl.; fuel, 5,126 bbl., and miscellaneous, 20,673 bbl.

Of the total 104,728 producing wells, 37,006 were flowing and 67,722 were on the pump.

OIL AND GAS LEASE PROPERTY FOR SALE

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(The date of this sale has been changed from October 18, 1947 to November 10, 1947)

105 acre lease, with two producing wells, derricks, pump houses, tanks, dwelling house, garage and all machinery and equipment, casing and pipe lines.

Also 160 acres of land owned in fee, adjoining said lease and used in connection with lease operations.

Located about six miles east of Kildare, Kay County, Oklahoma.

Sealed bids to be filed with the County Clerk of Kay County, Oklahoma, at Newkirk, Okla., where they will be opened on November 10, 1947, at ten o'clock, A.M.

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Among the Drilling Contractors

Crowd of 750 Attend A.A.O.D.C. Meeting

Shortage of tubular goods and rising drilling costs were of primary concern to the 750 persons gathered in Long Beach, Calif., last week for the seventh annual convention of the American Association of Oilwell Drilling Contractors.

New officers elected during the October 13-15 meeting were: E. C. Brown, Brown Drilling Co., Long Beach, president; Joe S. Morris, San Antonio, vice president at large; George S. McQueen, McQueen & Clevenger Drilling Co., Fort Worth, vice president for West Texas and New Mexico; D. B. Ferguson, Carmi, Ill., vice president for cable tools; Lester D. Cain, Houston, vice president for central Mid-Continent; D. H. Graham, Dunlap & Graham Drilling Co., Long Beach, vice president for California; R. M. Olds, Mount Carmel, Ill., vice president for Illinois, Michigan, Indiana, and Kentucky; J. Zeppa, Delta Drilling Co., Tyler, Tex., vice president for Cretaceous and Tertiary basins; E. E. Pickering, Pickering Drilling Co., Houston, vice president for well servicing; C. J. Paine, F. B. Paine Drilling Co., treasurer; Brad Mills, Dallas, executive vice president, and J. Doyle Settle, Dallas, secretary.

(A more detailed coverage of the meeting is given in the News Development section of this issue of the Journal.)

Calvert & Willis Busy On Three Illinois Jobs

Calvert & Willis, Inc., Olney, Ill., are presently drilling on the following three Illinois contracts: Central Pipe Line Co. 1 F. Sanders, semiwildcat, 20-3s-14w, White County; Inland Producers, Inc., and Calvert & Willis, Inc., 3 Cantrell, 6-6s-6e, Hamilton County; and J. J. Lynn and Otto Hume 1 Consolidated, 26-7n-10e, Jasper County.

New Rocky Mountain Drilling Firm Organized

George Acuff, former Rocky Mountain superintendent for Kerr-McGee, and B. F. Allison, Cut Bank, Mont., have formed Acuff-Allison Drilling Co. Their first job was an Ohio Oil Co. extension well to Dry Creek field, Montana.

Lowell-Voltz Moves To Colorado Springs

Lowell-Voltz, Inc., formerly Lowell Drilling Co., Inc., will change its headquarters from Wichita, Kans., to Colorado Springs, Colo., November 1. This move was prompted by the firm's extensive activities in the Rocky Mountain area. Don Davis will stay in Wichita to represent the company.

Double-R Drilling Co. et al are starting 1 W. J. Arthur, Jr., SE SE SE 22-14n-1e, a wildcat northeast of Luther, northeastern Oklahoma County, Oklahoma. The test is on a 1,600-acre block and contract is for 6,000 ft. or second Wilcox sand.

Canemona Drilling Co. is drilling a wildcat for Barron-Steele Co. on 130,000-acre block 42 miles north of Flagstaff, Ariz. The test is being drilled in Supai sandstone on land leased from Babbitt Brothers, State of Arizona, and the Indian Service.

Rocky Mountain Drilling Co., Los Angeles, is under contract for Standard Oil Co. of California 1 Houghton Community, Santa Fe Springs field, California.

B & R Drilling Co., Russell, Kans., has contract for Harry Gore et al 1 Alexander, CSL SW NW 24-7-21, a wildcat in Graham County, Kansas.

Suntex Drilling Co. has staked location for its 1 Wheeler, NE NW NE 33-11n-2e, a wildcat 3 miles south of McCloud, northwestern Pottawatomie County, Oklahoma.

Exploration Drilling Co., Electra, Tex., is drilling a wildcat about 4 miles southeast of Sweetwater, Tex., its 1 Stroman, Section 81, Block 21, T&P Survey. The test is scheduled for 6,600 ft.

Glenn Gillespie & Sons, Cushing, Okla., have contract for Jergins Oil Co. 1 Pearl, NE SE SW 29-19n-4w, a wildcat on flanks of Marshall field, Logan County, Oklahoma. Contract is for 6,250-ft. or second Wilcox sand. Bahan Brothers, Guthrie, is supporting.

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Pages 3101 to 3120

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Durbin-Boomer F-2—2 swivels, ½, ⅝ or ¾" chain

Malleable Iron • Heat Treated • 5 Sizes
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DEI-TA No. 1—1 swivel, ⅜ or ½" chain
DIXIE No. 1—2 swivels, ⅜ or ½" chain
LONE STAR 1—2 swivels, ⅜, ½ or ⅝" chain
LONE STAR 2—2 swivels, ½, ⅝ or ¾" chain

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Clayton Severns and Associates, Los Angeles, will drill Union Oil Co. 32-2 Naranjal, Brea-Olinda field, California.

Gilliam Drilling Co., Gainesville, Tex., has staked 1 McFarland, 330 ft. from north and 3,050 ft. from east lines, Block 216, Wilkins Survey A-411, a 3,500-ft. wildcat 1½ miles south of Goree, Knox County, North Texas.

Beardmore Drilling Co., Wichita, and Bay Petroleum Corp. have started 1 Unruh, NW NW NE 10-19-1, a test 2 miles north of Canton and ½ mile east of Jenday pool, McPherson County, Kansas. The operators hold a 440-acre tract.

C. L. Brown, Corsicana, has received contract for M. M. Miller 1 J. C. Rogers, a wildcat in Limestone County, East Texas, 4 miles northwest of Horn Hill. The test is on a 118-acre tract in P. S. McNeel Survey and contract is for 5,500 ft. or Travis Peak.

Harbar Drilling Co., Wichita, has hit pay with its Russell County, Kansas, wildcat, the 1 Meier, NE NE NE 20-15-12. The 1 Meier pumped 4 bbl. of oil in 8 hours on test of Arbuckle.

McCall & Cline will drill a 2,600-ft. contract for L. A. Messmer, the 1 Warnock, 330 ft. from south and 830 ft. from west lines, NW SE 6-2s-10w, Gibson County, Indiana.

Hall-Miller Drilling Co. is starting on a 6,000-ft. wildcat at its 1 Ecker, SW SW NE 31-13n-2e, Jones pool area, Lincoln County, Oklahoma. Hall-Miller recently extended production to the southeast in the Jones area.

Buffalo Drilling Co. has hit a good well with its Gallatin County, Illinois, wildcat, the 1 Mills, NW SW SW 4-8s-9e. The 1 Mills tested 30-40 bbl. per day from Tar Springs sand at 2,320-40 ft. The test is 2 miles from other oil production.

Ashby Bros. Drilling Co., East St. Louis, is contractor for Ashland Oil & Refining Co. 2 L. B. Jacobs, NE NW NE 14-P-28, Daviess County, Kentucky.

Zephyr Drilling Co., Tulsa, has contract for Carter Oil Co. 2 W. W. Garvin, C NW SE 6-1n-1w, Katie pool, southern Garvin County, Oklahoma.

Lowell Drilling Co., Wichita, and J. C. Dozier have staked location for their 1 Miller, NW NW NW 27-10-21, a wildcat 6½ miles south of Morel pool, Graham County, Kansas.

Graco Drilling Co., Inc., with a Kansas charter, has been granted permit to do business in Oklahoma, with $15,000 paid-in capital.

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For oil field, locomotive type and marine boilers. Water shows black — steam shows white; the water level is unmistakable. U-Bolt construction is strongest and simplest to service. Glass replaced by simply removing nuts on face of gage . . . unnecessary to work between gage and boiler. Conforms with A.S.M.E., Federal and State requirements when used for pressures specified by their respective codes.

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STATISTICS and T

WEEKLY WELL COMPLETIONS . . . WEEK ENDED OCTOBER 18, 1947

	Total of all wells					Cum.		Wildcat completions and discoveries									
													Cumulative total, 1947				
	Comp.	Oil	Gas	Dry	Footage	1947	1946	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	46	23	0	*23	63,492	1,360	1,269	0	0	0	0	0	3	0	0	2	5
Pennsylvania	72	35	10	†27	120,988	2,410	3,190	0	0	0	0	0	0	0	3	1	4
West Virginia	19	4	12	3	47,705	691	595	1	0	4	1	6	3	0	25	16	44
Ohio	23	8	4	‡11	63,290	1,056	997	0	0	0	2	2	0	0	5	38	43
Indiana	14	5	1	8	25,293	516	300	0	0	0	0	0	22	0	0	35	57
Kentucky	23	12	1	10	38,775	557	376	0	0	0	0	0	8	0	0	33	41
Illinois	34	20	1	13	107,551	1,641	1,862	0	0	0	8	8	56	0	1	280	337
Michigan	21	8	2	11	45,106	715	653	0	0	0	6	6	8	0	10	186	204
Kansas	56	29	13	14	174,505	2,095	1,582	3	0	0	2	5	34	0	13	272	319
Neb., Mo., Iowa	1	0	0	1	1,601	5	15	0	0	0	1	1	0	0	0	5	5
Oklahoma	87	45	6	‖36	282,129	‖3,267	2,252	2	2	1	14	19	95	7	18	550	670
Texas	200	118	8	74	828,439	7,258	6,305	6	2	0	40	48	232	50	68	1,106	1,456
North Central (Dist. 7-B & 9)	56	26	0	30	158,561	2,318	2,223	2	0	0	12	14	67	0	10	369	446
West (Dist. 7-C & 8)	47	40	0	7	232,447	1,764	1,387	0	0	0	2	2	30	0	3	133	166
Panhandle (Dist. 10)	14	6	5	3	38,097	368	264	0	0	0	1	1	1	0	1	10	12
Eastern (Dist. 5 & 6)	18	10	2	6	81,288	428	575	0	0	0	5	5	8	2	5	95	110
Gulf Coast (Dist. 3)	25	16	0	9	139,800	1,248	1,389	1	2	0	5	8	57	36	29	232	354
Southwest (Dist. 1, 2 & 4)	40	20	1	19	178,246	1,132	467	3	0	0	15	18	69	12	20	267	368
Louisiana	41	33	1	7	207,112	1,204	1,098	0	2	0	6	8	32	20	9	164	225
Northern	29	23	1	5	90,637	701	621	0	0	0	5	5	3	1	3	101	108
Southern	12	10	0	2	116,475	503	477	0	2	0	1	3	29	19	6	63	117
Arkansas	13	5	1	7	51,000	248	146	0	0	0	2	2	1	0	0	45	46
Mississippi	14	7	2	5	116,080	386	196	0	0	0	3	3	1	0	1	74	76
Southeastern States	1	1	0	0	11,573	50	36	0	0	0	0	0	0	0	0	42	42
Montana	10	3	4	3	18,987	232	256	0	0	1	1	2	6	0	6	21	33
Wyoming	7	5	2	0	39,471	194	136	0	0	1	0	1	11	0	5	32	48
Colorado-Utah	2	2	0	0	13,249	162	127	0	0	0	0	0	2	0	3	38	43
New Mexico	9	6	1	2	46,870	424	323	0	0	0	0	0	5	0	1	30	36
California	50	41	1	8	216,739	1,572	1,268	1	0	1	6	8	41	0	7	225	273
Total United States	743	410	70	263	2,519,957	26,043	22,982	13	6	8	92	119	560	77	175	3,195	4,007
Total previous week	710	404	62	244	2,396,030	‖25,300	22,412	13	0	3	80	96	547	71	167	3,103	3,888
Total October 19, 1946	570	267	81	222	1,866,808			15	2	4	76	97	453	35	101	2,738	3,327

Service wells included: *23, †26, ‡5, §2. ‖Revised.

CRUDE PRICES AND REFINERY ACTIVITY

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.*	Oklahoma, Kansas	Gulf Coast Tex.†	West Tex.‡
18-18.9	$1.60	....	....	....
19-19.9	1.65	....	....	....
20-20.9	1.69	$1.75	....	$1.62
21-21.9	1.73	1.77	....	1.64
22-22.9	1.77	1.79	....	1.66
23-23.9	1.80	1.81	....	1.68
24-24.9	1.84	1.83	$2.06	1.70
25-25.9	1.88	1.85	2.08	1.72
26-26.9	1.91	1.87	2.10	1.74
27-27.9	1.95	1.89	2.12	1.76
28-28.9	1.99	1.91	2.14	1.78
29-29.9	2.02	1.93	2.16	1.80
30-30.9	2.06	1.95	2.18	1.82
31-31.9	....	1.97	2.20	1.84
32-32.9	....	1.99	2.22	1.86
33-33.9	....	2.01	2.24	1.88
34-34.9	....	2.03	2.26	1.90
35-35.9	....	2.05	2.28	1.92
36-36.9	....	2.07	2.30	1.94
37-37.9	....	2.09	2.32	1.96
38-38.9	....	2.11	2.34	1.98
39-39.9	....	2.13	2.36	2.00
40 and above	....	2.15	2.38	2.02

*Standard Oil Co. of California posting. †For crude from Daboval, El Campo, and Sandy Point. ‡Includes Lea County, New Mexico.

A.P.I. REFINERY REPORT, WEEK ENDED OCTOBER 11

(Thousands of barrels)

District—	Crude runs, daily avg.	Production				Stocks at refineries, bulk terminals, in transit and in pipe lines			
		Gasoline†	Kerosine	Gas & dist. oil	Residual	Gasoline*	Kerosine	Gas & dist. oil	Residual
East Coast	852	2,122	295	1,283	1,738	18,371	8,844	19,399	9,557
Appalachian:									
District 1	90	324	52	81	86	2,094	453	812	402
District 2	64	225	37	63	109	843	111	217	234
Ind., Ill., Ky.	811	2,918	370	841	1,091	14,132	3,043	8,509	5,451
Okla., Kans., Mo.	437	1,538	166	527	478	6,728	1,354	3,533	1,523
Inland Texas	236	1,055	106	137	419	2,495	654	572	832
Texas Gulf Coast	1,324	4,029	782	1,995	1,873	15,058	4,423	9,510	8,261
La. Gulf Coast	416	1,276	335	506	400	5,015	2,237	2,975	2,353
N. La. and Ark.	72	174	52	72	99	1,289	572	470	207
Rocky Mountain:									
New Mexico	13	41	3	11	19	80	20	21	29
Other Rocky Mtn.	129	386	31	138	212	1,423	174	910	652
California	843	2,431	24	885	2,253	14,674	1,172	14,170	27,778
October 11, 1947	5,296	16,519	2,253	6,539	8,777	82,202	23,057	61,098	57,279
October 4, 1947	5,309	16,458	2,071	6,241	8,517	81,607	22,778	60,223	57,504
October 12, 1946	4,801	14,921	1,958	5,942	8,220	87,724	21,528	64,872	60,458

*Finished and unfinished. †At refineries including natural blended.

Bureau of Mines crude-oil stocks 222,433,000 bbl. as of October 11—down 1,796,000 bbl. One year ago 221,931,000 bbl.

FLAT CRUDE PRICES

Representative posted schedules per bbl.

East Texas	$2.15
Kettleman Hills, California*	2.14
Beauregard Parish	2.10
Illinois Basin	2.27
Pecos County, Texas (Yates)	1.85
Bradford, Pennsylvania	4.50
Eastern Ill. and Western Ind.†	2.27
Tomball, Texas Gulf Coast	2.33

*37°-37.9°. †35° and above.

TRENDS

DAILY AVERAGE PRODUCTION FOR WEEK

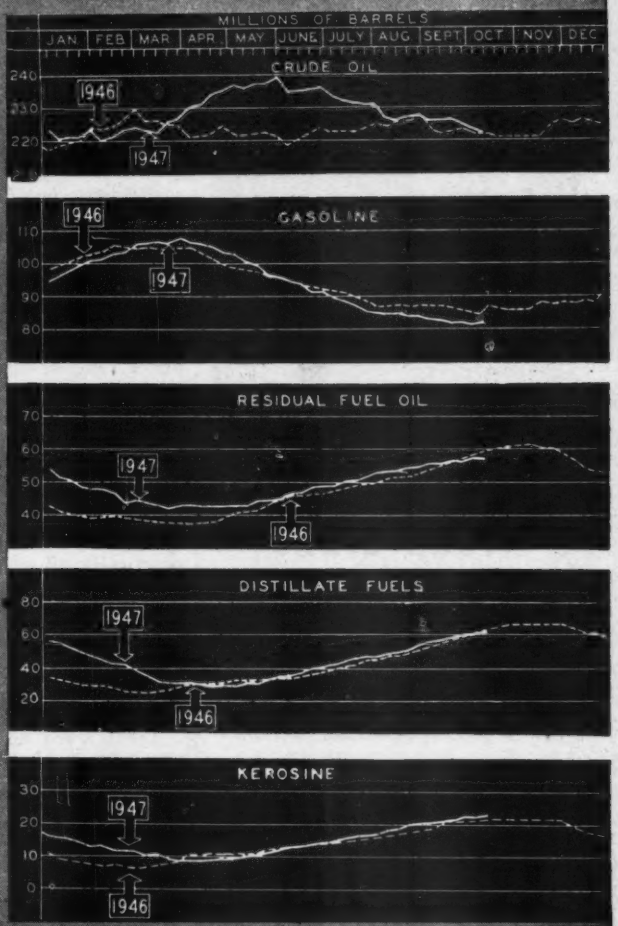
	Oct. 18 crude oil	B. of M. Oct. demand	Oct. 11 crude oil
Alabama	1,300	1,200	1,150
Arkansas	83,550	82,000	82,900
California	929,450	930,000	921,300
Colorado	46,660	46,000	47,920
Eastern	63,200	65,200	64,600
Florida	675	1,000	1,050
Illinois	169,800	200,000	172,800
Indiana	16,200	18,000	17,600
Kansas	304,450	309,000	288,050
Kentucky	25,300	26,000	25,700
Louisiana	452,550	450,000	452,050
North Louisiana	111,950	.....	111,450
South Louisiana	340,600	.....	340,600
Michigan	46,925	45,000	48,260
Mississippi	102,130	100,000	98,080
Montana	24,740	24,000	25,250
Nebraska	550	600	550
New Mexico	116,750	112,000	116,750
Oklahoma	402,150	405,000	402,300
Texas	2,376,350	2,300,000	2,376,350
Dist. 1 (Southwest)	24,400	.....	24,400
Dist. 2 (Southwest)	162,150	.....	162,150
Dist. 4 (Southwest)	260,425	.....	260,425
Dist. 3 (Gulf Coast)	492,375	.....	492,375
Dist. 5 (Eastern)	41,060	.....	41,060
Dist. 6 (Eastern)	118,300	.....	118,300
East Texas Field	321,000	.....	321,000
Dist. 7-C (West)	40,590	.....	40,590
Dist. 8 (West)	646,225	.....	646,225
Dist. 7-B (W. Central)	43,975	.....	43,975
Dist. 9 (N. Central)	136,500	.....	136,500
Dist. 10 (Panhandle)	89,350	.....	89,350
Wyoming	120,320	125,000	118,020
Total United States	*5,283,050	5,240,000	5,260,680

Change from prev. wk., up 22,370

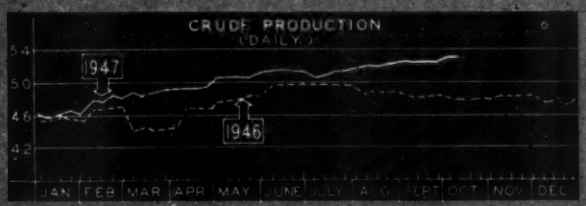
Total production January 1-October 18 . †1,462,129,565 bbl.
Same period last year (crude plus cond.) 1,381,017,310 bbl.

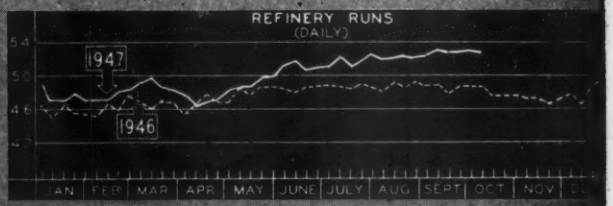
*Not incl. 41,965 bbl. condensate. †Incl. 9,491,295 bbl. condensate.

OIL STOCKS IN THE UNITED STATES

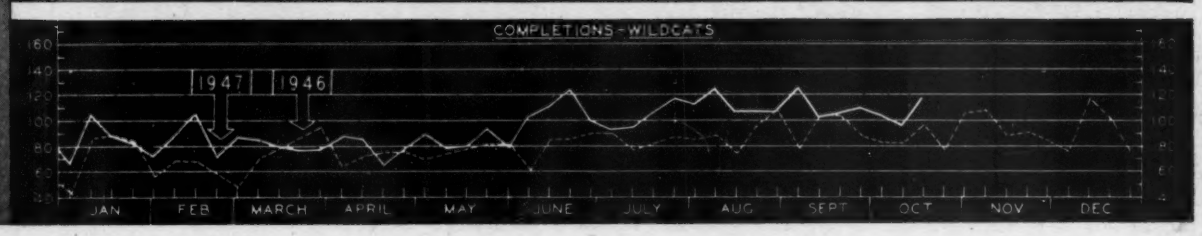


DAILY OPERATIONS





Solid line charts weekly completions, service wells in Eastern area included.



TAPECOAT Those "Weak Links"

In Your Fight Against Corrosion...

It doesn't make sense to protect pipe with quality coatings and then use makeshift protection on pipe joints. After all, protection is only as good as its weakest joint.

That's why more and more distribution engineers are standardizing on TAPECOAT—the dependable wrapping in tape form that provides pipe joint protection equivalent to the mill coating on the pipe.

TAPECOAT is easy to apply. You simply spiral wrap the joint, starting and ending on the mill coated pipe, thus making the protection on the joint equal to the coating on the pipe. It will pay you to guard against those "weak links" with TAPECOAT.

Write for complete details.

The TAPECOAT Company

1523 LYONS STREET EVANSTON, ILLINOIS

MARKETS

TANK-CAR prices of motor fuel were generally ½ cent higher this week throughout the Mid-Continent and Midwestern area as a result of the October 15 crude-oil advance of 20 cents a barrel.

Distillate heating oils, which are being subjected to increasingly heavy demand pressure despite continued warm weather, were generally up ¾ cent as an aftermath of the crude increase. *(For other information on the crude increase, see page 64.)*

Residual fuel oil was selling at prices ranging upward from $2 early this week. This product, weak during August and September when much consumer storage was filled, had already began to firm before the crude advance, informed sources said.

Natural Gasoline Also Up

Higher prices were announced for practically all other petroleum products as refinery postings immediately reflected the increased cost of crude oil. Higher motor-fuel prices brought a full ½-cent increase in natural gasoline which early this week was quoted at 6⅜ cents North Texas and 6⅞ cents Group 3.

There were no signs that the increase in products prices was slowing down demand. Suppliers reported an even heavier influx of calls, particularly for distillate heating oils. Many distributors are attempting to line up material for the winter months.

The higher products prices also showed little effect on the current spread between contract prices and those on the open spot market. Material for delivery on a noncontract basis continued to command prices ranging from ½ to 1 cent above the publication prices on distillate heating oils, and from ¼ to ½ cent above on motor fuel.

Regular-grade gasoline early this week was moving on most contracts at prices from 9 to 9¼ cents, against 8½ to 3¾ cents a week earlier. Prices for other products, on a contract basis, included: 42-44 kerosine 8 to 8¼ cents, No. 2, 7½ to 7⅝ cents (up ¾ cent from week earlier), 32-36 Zero gas oil, 6⅝ to 7 cents, and residual, $2.10 to $2.25 per barrel.

New Midwestern Tank Wagon

Because of the increase in crude prices, Standard Oil Co. (Ind.) advanced its tank-wagon prices October 22, as follows: naphtha and gasoline, 8/10 cent; kerosine, ½ cent; heater oils, 1 cent; power fuel, 1½ cents; furnace oil, 8/10 cent; high-speed diesel fuel, 1 cent; and residual fuels, 4/10 of a cent.

Effect of the crude-oil advance appeared slower in affecting products markets on the Gulf Coast and in the East. In New York, it was made known that Standard Oil Co. of New Jersey, the Eastern Seaboard's largest supplier, will ration its residual-oil consumers some 10 to 15 per cent below 1946 deliveries.

Products on the Gulf Coast were scarce late last week with prices showing signs of rising. Reports said that most of the available products were pulled off the market after the crude price hike, and marketers were awaiting possible new postings this week before making offers. Increased prices were noted for No. 6 residual fuel which was bringing as much as $2.80 when available. Unconfirmed reports said that a cargo of 73-75 octane regular gasoline brought 12 cents.

Representative Quotations

Representative spot-market quotations of leading suppliers as of October 20, 1947. Figures are f.o.b. plant for tank-car shipment in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor	Texas Gulf Coast
Regular gasoline, 73-75 octane	9-10½	10.5-10.9* 9.3-9.10†	9-10½
Premium gasoline, 78-80 octane	9¾-11¾	10.2-12	9½-11½
42-44 w.w. kerosine	7¾-8¾	7.8-8.3	7¾-8⅛
No. 2 straw fuel oil	7⅛-8½	6.8-7.2	7¾-8¼
No. 6 residual	$2-2.25	$2.22-2.52	$2.60-2.80

*Branded (74-76 octane); †Unbranded (74-76 octane).

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	6⅞	6⅜	6⅝
Grade 18-55	8.25	7.65	7.95

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	11-12¼
750 vis., No. 3-4 neutral	13-14½
2,000 No. 5-6 neutral	14½-16

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	29-31
200 vis. No. 3 neutral, 0-10 pp.	18-19

Western Pennsylvania

145-155 vis. 10 p.t. bright stock	45
180 vis. p.t. neutral	43

CRUDE-SCALE WAX

Mid-Continent

130-132 A.S.T.M. melting point	7½-7¾

Current and Future Supply of Tubular Goods

(Continued from page 81)

export one of our most valuable national resources, which revolves year after year; the loss of scrap when it is melted in the open hearth furnace or cupola is small; and nearly everything made of steel or iron sooner or later becomes scrap and returns to the open hearth or foundry for remelting. During the war we exported an enormous amount of steel in the form of munitions; also rolled and semifinished steel, to aid our Allies. Now it is all overseas, and in addition, there is a large tonnage of scrap created by bombing of buildings and bridges, and destruction of enemy armament, but for some reason, none of it returns to America where it is so badly needed. I have asked many of my friends in the steel business why they cannot secure scrap from abroad. Thousands of American ships have gone to Europe loaded with relief supplies, and return in ballast, and the only plausible explanation I have ever received, was lack of labor and inland transportation. It seems strange to me, in view of the dollar famine abroad, and the very high price of scrap, that foreign nations cannot pick up this scrap, load it in cars, transport it to seaboard, and load it in waiting ships. It is my opinion that at least 3 or 4 million tons of this valuable material should be returned to this country to increase the production of steel.

Charges and Countercharges

The steel industry has been charged with holding back expansion in order to maintain prices and increase profits, but I call your attention to the fact that the leading steel companies do not make as large a margin of profit, based on their sales or capital investment, as the largest oil companies or the largest automobile companies. There was loud criticism of the steel industry every time they raised prices after wages increased, but very little was said when the oil industry and the automobile industry advanced their prices, and I remind you when I say this, that my company had to pay the increases in the price of steel. When a theorist talks about expanding capacity to make steel, he probably does not know that if a new seamless-tube mill were built at today's cost, it would never pay on the present cost of raw steel. . . .

The pipe manufacturers have been charged with exporting an abnormal tonnage of pipe, and some people think at premium prices. Before commenting on tonnage, let me say that the National Supply Co. in all cases, charges the same price for pipe shipped abroad as we receive for pipe sold in the domestic market. I cannot speak for competitors, but have every reason to believe that they follow the same practice. In fact, it is foolish to assume that companies who buy for export, most of whom also buy for domestic use, would pay a higher price for pipe going out of the country.

With reference to tonnage, we have always exported pipe and here are some figures which may be of interest: In 1935, American manufacturers exported 3.5 per cent of the pipe produced; 1936—2 per cent; 1937—4.2 per cent; 1938—4.8 per cent; 1939—5.1 per cent; and 1940—9.3 per cent.

It should be remembered that the war in Europe started in 1939, and British and German mills were out of the market in 1940, and the world had to come to this country for pipe.

In 1946, 7.7 per cent of the pipe manufactured was exported, and during the first half of 1947, 10 per cent was exported.

In Defense of Exporting

In defense of the practice of exporting pipe, let me say that considerably more than half of the pipe shipped abroad is purchased by subsidiaries of American oil companies operating principally in South America, and a large amount of the oil they produce is returned to this country, or sold to the U.S. Navy. You may not know that 311,000 bbl. per day were imported in 1945; 370,000 bbl. per day in 1946; and during the first half of 1947, about 450,000 bbl. per day. These figures do not include foreign oil sold to the U. S. Navy, which otherwise would have to be purchased in this country. . . .

Some people believe that large companies are better treated in the allocation of pipe, than small companies and independent operators. In this matter I can speak only for the National Supply Co. Our sales department has made careful allocation of the tonnage we have to sell, based on tonnage shipped during the past 5 years, and if they have ever leaned backwards, or broken our rule of allocation, it was to help some small operator who was in trouble and had nowhere else to go. I hope our competitors are following a similar policy.

We also hear reports of black markets in pipe, and I have no doubt they exist in a small way. There always have been cunning and unscrupulous people who try to make money out of abnormal situations, and the misfortunes of others, but I have yet to hear of a transaction where pipe was sold at black market prices through connivance with a tube mill. It may be that pipe has fallen into the hands of producers who have not needed it, and they have sold it at a profit to someone who sold it again at black market prices, but I believe such cases are few, and tales about such transactions are grossly exaggerated. I hope that anyone of you who has knowledge of what is, or seems to be a black-market transaction will immediately report it to the manufacturer of the pipe, with sufficient information to permit an investigation. If any such case comes to our attention, I promise you appropriate action will be taken, and if any employe of our company is found to have knowingly entered into a black-market deal, we will quickly dispense with his services. We sell our pipe at published prices, and we do not intend to permit anyone who has purchased it for use, to resell it at exorbitant profits; or suppliers who buy for resale to put black market prices on our product; but remember, we have no control over used pipe sold by someone who is not a customer of our company. I am sure our competitors share the opinions I have expressed, and are doing everything they can to stop black market deals. . . .

Perhaps you would like to know something about the prospective supply of pipe for the year 1948. In my opinion, if there are no strikes affecting the industry; if there is no shortage of fuel; there probably will be a little more pipe produced in 1948 than in 1947, but I am not so optimistic as to believe that the era of strikes is behind us, and I also am sure that there will be a fuel shortage this coming winter, in Western Pennsylvania and Eastern Ohio, where most of the tubular goods is produced. We cannot overlook the fact that the Marshall Plan contemplates shipment to European nations of a large tonnage of steel, also coal, needed in this country to make steel. I doubt if anyone knows how much this tonnage will be. It is not likely that much of it will be oil-country tubular goods, but any steel taken from American manufacturers will reduce the supply of steel available to make pipe.

These discouraging comments again raise the question, "When will there be an adequate supply of pipe?" and my answer must be, "Tell me when there will be a general business recession in this country, and I will tell you when there will be a plentiful supply of oil country tubular goods and line pipe."

If my remarks appear to be of a pessimistic nature, let me remind you that this year we expect to produce more pipe than ever before, and the petroleum industry will no doubt make a new record for oil production. . . .

A.C.S. Talk Scheduled

Dr. K. C. D. Hickman, an English chemist who joined Eastman Kodak Co. in 1925 as research chemist and who is at present vice president and director of research for Distillation Products, Inc., will address the Tulsa section, American Chemical Society, Mayo Hotel, Tulsa, November 4.

EQUIPMENT MEN ... in the News

Snodgrass Named Vice President

C. S. SNODGRASS

C. Stribling Snodgrass, a director of Bechtel Corp., will now serve as vice president in charge of engineering. Snodgrass will have charge of all engineering and development activities, with emphasis on the design and engineering of refineries and chemical plants.

In addition to his new duties with the domestic organization of the Bechtel construction interests, Snodgrass continues as vice president and director of Bechtel International Corp., and as a director of International Bechtel Inc. He will make his headquarters in San Francisco, hub of engineering operations directed by C. C. Steward, chief engineer.

Wheland Announces Promotions

R. E. Shafer, veteran employe of Wheland Co., Chattanooga, has been appointed general sales manager. James F. Blake, naval ordnance expert, succeeds Shafer as sales manager of the oil field equipment division.

Joining the firm in 1913, Shafer advanced in succession to the sales staff in the saw-mill division, manager of oil-field pump sales, purchasing agent for the company, and in 1945 was appointed sales manager of the oil-field equipment division. Blake is an Annapolis graduate and veteran of World War I. Between the two wars he held engineering and executive positions with several California organizations including Union Iron Works, Stoody Co., and Victor Equipment Co. During World War II, as a Captain USNR, Blake was head of the welding, casting, and forging division of the Navy Department Bureau of Ships.

Worthington Appoints Assistant Managers

The appointment of Edwin A. Murray and Howard M. Boteler as assistant managers of the Compressor Division at Buffalo, has been announced by Worthington Pump & Machinery Corp., Harrison, N. J. Murray is placed in charge of industrial and government compressor business; Boteler, in charge of oil refinery and chemical compressor business.

New Fiberglas Export Division

In a move designed to develop its export business, Owens-Corning Fiberglas Corp. has established an export division which will handle all relationships with foreign customers Gerard de Piolenc has been named manager.

Cooper-Bessemer Elevates Gehres and Boyer

Cooper-Bessemer Corp. of Mount Vernon, Ohio, and Grove City, Pa., announces the elevation of H. A.

H. A. GEHRES

RALPH L. BOYER

Gehres and Ralph L. Boyer. Gehres has been named executive vice president by the Cooper-Bessemer board of directors and Boyer's title is vice president and chief engineer.

Within the past 3 years the company's engineering division, under the direction of these two men, has come forward with a number of developments in the engine and compressor-building field. Latest achievement of company engineers was the announcement of the new "Turboflow" gas engine embodying entirely new principles which reduce fuel consumption of two-cycle engines to a record low of 8,500 B.t.u. per horsepower hour.

Metal Goods Corp. Named Distributor

International Nickel Co. has announced appointment of Metal Goods Corp., 817 Seventeenth Street, Denver, as distributor of primary nickel for alloying purposes and mill forms of Monel, nickel, and Inconel, in Colorado, Wyoming, and New Mexico.

Hughes Receives Steel Founders Award

Hughes Tool Co., Houston, received a safety award from the Steel Founders' Society of America following a national safety contest sponsored by the society's safety committee. The award was presented to M. W. Williams, Hughes Tool foundry manager, at the fall meeting of the society at the Wardham Park Hotel, Washington.

Sommer Joins Jefferson Chemical

Nolan B. Sommer has recently joined the sales department of Jefferson Chemical Co., Inc., as market-development representative. Dr. Sommer was previously a research chemist in the Stamford laboratories of American Cyanamid Co.

Western Co. Acquires Design Engineering

The Western Co., Seagraves, Tex., announces the purchase of facilities and equipment of Design Engineering Co., Tulsa. The personnel of Design Engineering Co. will continue in their present capacities.

Benefiel New Tulsa Representative

American Body & Trailer, Inc., with head office and factory in Oklahoma City, has announced the assignment of Chet Benefiel as their Tulsa area representative with sales office in the Thompson Building. Benefiel has been with American Body & Trailer since January 1, 1946, as its representative in Eastern Oklahoma and just recently has taken on the additional duties of covering the Tulsa area for the company on its complete line.

Equipment of special interest to the oil industry distributed by this company is American oil-field platform trailer, oil-field truck bodies, pole trailers, gasoline transports, geophysical bodies, Tulsa winches, Brown Lipe auxiliary transmissions, Rochester wire line, and Galion dump bodies.

Enterprise Elects New President

W. E. BUTTS

William E. Butts, a director for the past several years, has been elected president of Enterprise Engine & Foundry Co., to succeed Charles Hoehn, Sr., who retires after 30 years' direction of the company's activities in diesel engine, oil burner and food processing machinery. In addition to his responsibilities as head of Enterprise's operations, Butts will retain his present capacity as vice president of General Metal Corp., which position he has held for over 10 years. Hoehn will remain on the board of directors and serve in a special consulting capacity.

New Offices for Attapulgus Clay

Attapulgus Clay Co. and Porocel Corp., producers of Fullers earths and activated bauxites, announce removal of its executive, sales, and general offices from 260 South Broad Street, Philadelphia, to 210 West Washington Square, Philadelphia.

Spalding Addresses Drilling Contractors

John D. Spalding, works manager of the Torrance, Calif., plant of National Supply Co., spoke at an afternoon session of the national convention of the American Association of Oilwell Drilling Contractors. His speech was devoted to important developments in drilling and oil-field equipment. More than a thousand drilling contractors from the United States and Canada attended the convention in Long Beach.

Thompson-Hayward Acquires New Warehouses

Thompson-Hayward Chemical Co., Kansas City, has purchased two warehouses, located at Chicago and Minneapolis, and has started construction activities on another at Wichita.

The new Chicago warehouse, located at 121-31 West Pershing Road, replaces the Chicago warehouse facilities that were destroyed by fire in February. The new building is modern in every respect and will provide 30,000 sq. ft. of floor space. The Chicago office and warehouse is managed by M. A. Hall.

At Minneapolis, the property acquired is located at 909 Second Street South, and provides 33,000 sq. ft. of floor space. H. F. Farnam is in charge of operations.

The new Wichita warehouse, now under construction, is located at Osie and Mead streets and is expected to be ready for occupancy about the first of the year. C. F. Potts is manager.

Charles Bruning Adds Key Personnel

Charles Bruning Co., Inc., New York, announces appointments of Dr. M. S. Larrison as superintendent of the company's West Orange, N. J.,

DR. M. S. LARRISON

DR. A. H. STUART

chemical plant and Dr. A. H. Stuart as director of research.

Dr. Larrison was formerly associated with the Barrett Co. and Reilly Tar & Chemical Corp. Dr. Stuart was director of research of Schieffelin & Co. for many years. Both Dr. Stuart and Dr. Larrison will have headquarters at the newly acquired West Orange plant.

National Geophysical to New Location

National Geophysical Co., Inc., announces removal of its executive and accounting offices from Tower Petroleum Building to 8800 Lemmon Avenue, Dallas. The new location will house the company's main offices, laboratory, research department, and drill shop.

Du Pont Names Simpson

E. I. du Pont de Nemours & Co., Inc., announces the appointment of E. Hearn Simpson to the newly created position of assistant sales manager of petroleum additives, and Barry V. Cornwall to succeed him as sales manager for the alcohol and camphor section. Cornwall will also be manager of sales for "Five-Star" antifreeze.

Simpson's appointment is the result of expanding activities of Du Pont's petroleum chemicals division for the direct sale of tetraethyl lead to the refining industry. Du Pont will start marketing its own antiknock compounds on January 1, 1948.

New Managerial Organization in Fluor

S. E. MESERVE

Fluor Corp., Ltd., Los Angeles, has announced its new managerial organization following a recent special meeting of the board of directors, which was necessitated by the untimely death of the company's president and chairman of the board, Peter E. Fluor.

Shirley E. Meserve, vice president and general counsel, was elected president. Meserve has supervised Fluor's legal affairs since 1926, being made a director of the corporation in 1937. He is also a senior member of the law firm of Meserve, Mumper and Hughes, Los Angeles.

W. Earl Dunn, vice president and general manager, will now serve as executive vice president; D. W. Darnell, vice president and chief engineer, was promoted to vice president and general manager; and J. Robert Fluor, manager of manufacturing, was named vice president and assistant general manager. James P. Wiseman, director of sales, and T. H. Seavey, manager of purchases, were made vice presidents. Francis E. Fischer continues as secretary-treasurer.

Robert L. Merrick, assistant chief engineer, was elevated to chief engineer, and Foster M. Stephens, director of development, was advanced to assistant manager of manufacturing.

Fluor's board of directors consists of Meserve, Dunn, Darnell, J. R. Fluor, Wiseman, Seavey, Fischer, and Fred C. Fluor.

Rheem Names Gumpert

E. A. Gumpert of Bloomfield, N. J., has been appointed assistant advertising manager for Rheem Manufacturing Co. Gumpert will be in charge of direct-mail activities, advertising production and trade shows for the company. He will assist with the administration of the department, reporting directly to C. L. Johnson, advertising manager.

Miller on Mid-Continent Tour

Attending the A.I.M.E. convention in Tulsa was George Miller, president of Oil Base, Inc., Compton, Calif., makers of Black Magic oil-base drilling fluid. Miller expects to visit Oklahoma City, Dallas, Fort Worth, and Houston, planning a short stay at each of the company's branch offices. At St. Louis he will inspect special equipment being built for the new Oil Base plant in Compton.

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FOR SALE: One 7¾ x 18 Model 15,000 Whelan-Lucey Power Slush Pump as good as new. Melton Supply Co., Box 1360, Seminole, Okla.

FOR SALE: New 3" Drill Pipe with Tool Joints standard weights R-2. Box B-734, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 1—Cardwell Drilling Rig, S Drawworks w/ Hercules Motor, 7¼x12 G. D. pump, w/ E. K. Waukesha Motor, 87 ft. Lee C. Moore Mast, 3500 ft. 3½" Drill pipe and all other accessories necessary to drill well. F.O.B. Illinois, $27,500.00. Box B-960, The Oil and Gas Journal, Tulsa, Oklahoma.

EQUIPMENT FOR SALE

FOR SALE: 1—Wilson Mogul Drilling Rig D. W. Compound. 2—G. A. K. Waukesha Motors, 6/16 Wilson Snyder pump, 87 ft. L. C. Moore Mast, 3100 ft. 3½" Drill pipe, and all other accessories necessary to drill well. F.O.B. Illinois, $25,000.00. Box B-961, The Oil and Gas Journal, Tulsa, Oklahoma.

AT SEMINOLE, Oklahoma, One HS-6 SKRL Cardwell Well Servicing Unit, Powered by Waukesha Motor, Mounted on 1936, 157" Wheelbase, Ford Truck, $1,750.00. Cities Service Oil Co., Mr. H. D. Patridge, Bartlesville, Oklahoma.

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FOR SALE: Model 55 Wichita Spudder less mast with PA-100 International engine in good condition. Located close to Pampa, Texas. Nabob Oil & Gas Company, Box 448, Amarillo, Texas.

FOR SALE: 1—25 H.P. Superior Engine, new clutch. 18' Bandwheel Power complete with belt and tightener. Boyer Oil Co., Box 35, Iola, Kansas.

FOR SALE: New 5" x 10" Worthington TYPE KMS-1 Pump. Box B-733, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 5½—Keystone Spudder complete with tools from 6 inch to 10 inch. F. W. Black, Paola, Kansas.

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20—2,000 Gal. Gasoline Tanks, with Pumps and Motors mounted on semi-trailers. 20—New A.P.I. High 500 bbl. Bolted Steel Tanks. 10—New A.P.I. Low 500 bbl. Bolted Steel Tanks. 10—1,000 bbl. new A.P.I. Bolted Steel Tanks. 2—10,000 bbl. New A.P.I. Bolted Steel Tanks. Also new Welded Steel Tanks. Also used Oil, Grain and Water Tanks in all sizes.

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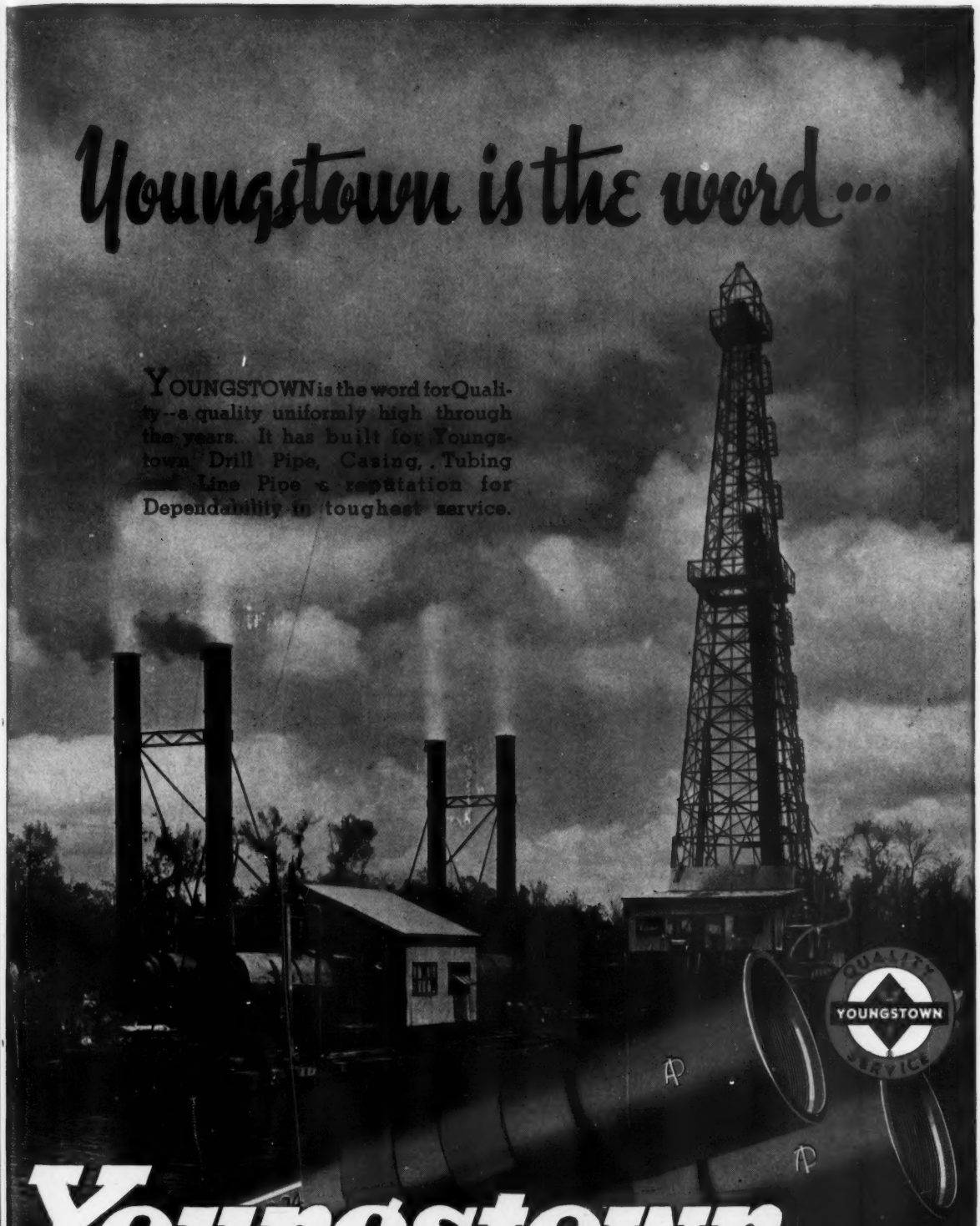

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